NEWTOWN ESTATES - UNIT IV
PRELIMINARY SOIL REPORT

WAIMALU, OAHU, HAWAII
TAX MAP KEY: 9-8-02: POR. 9

To:
COMMUNITY PLANNING, INC.

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

JULY 12, 1976

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

WALTER LUM
EDWARD WATANABE
EZRA KOIKE
WALLACE WAKAHIRO
3030 WAIALAE AVE., HONOLULU, HAWAII 96816 • TEL. 737-7931

July 12, 1976

MR. GEORGE HOUGHTAILING
Community Planning, Inc.
Suite 608, 700 Bishop Street
Honolulu, Hawaii 96813

Dear Mr. Houghtailing:

Subject: Newtown Estates - Unit IV
Preliminary Soil Report
(for site grading for residential development)
Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

Transmitted herewith is our preliminary soil exploration report for site grading design considerations for residential development at the proposed site for Newtown Estates - Unit IV at Waimalu, Ewa, Oahu, Hawaii.

This report includes a Boring Location Sketch, boring logs, laboratory test results, general site grading design guidelines and limitations.

Respectfully submitted,

WALTER LUM ASSOCIATES, INC.

By Ezra Koike
Ezra Koike

SHL/EK:vl

C O N T E N T S

NEWTOWN ESTATES - UNIT IV
PRELIMINARY SOIL REPORT

WAIMALU, EWA, OAHU, HAWAII
TAX MAP KEY: 9-8-02: POR. 9

SCOPE OF EXPLORATION

The purpose of this exploration was to evaluate general soil conditions for site grading design considerations for residential development for the proposed Newtown Estates - Unit IV at Waimalu, Ewa, Oahu, Hawaii.

This report includes field explorations, laboratory tests, general site grading design guidelines and limitations.

This report has been prepared for the exclusive use of Community Planning, Inc. and their design consultants as a guide in the design of this specific project. The report has not been prepared for use by other parties and may not contain sufficient information for other uses.

FIELD EXPLORATION

Twenty-three borings were made at the site. The approximate locations of these borings are shown on the Boring Location Sketch. Descriptions of the underlying soils encountered are shown on Boring Logs Nos. 1 thru 23.

Borings were made with 4-in. diameter augers using a finger type bit. Soil samples were recovered with 3-in. thin-wall tube samplers advanced hydraulically and with 2-in. standard split spoon samplers driven with a 140-lb hammer falling 30 inches.

Logs of 6 borings from the adjoining subdivision, "Newtown Estates - Unit III," July 23, 1973, are attached for reference.

LABORATORY TESTS

Laboratory tests included: natural water content and density, unconfined compression, laboratory vane shear, Atterberg limit, specific gravity, ASTM D 1557-70 density and CBR.

A summary of the laboratory test results is given in Tables 1A thru 1E.

GEOLOGIC AND SOIL DESCRIPTIONS BY OTHERS

From a review of geologic literature and the U. S. Soil Conservation Service maps of the area, the soils are generally described by others as follows:

Stearns, H. T. and U. S. Geological Survey, "Geologic and Topographic Map of Island of Oahu," 1938:

Tkb - Koolau Volcanic Series
Basaltic lava flow

U. S. Soil Conservation Service, "Soil Survey of Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii," August 1972:

MoB, MoD2 - Manana silty clay loam, 2 to 6% and 12 to 25% slopes, respectively
Unified Soil Classification - MH

M_pB, M_pE - Manana silty clay, 3 to 8% and
25 to 40% slopes, respectively
Unified Soil Classification - MH

SOIL CLASSIFICATION SYSTEM

Soil samples were visually observed and subjected to appropriate tests in the laboratory. Based on visual observations and laboratory tests, the soil descriptions given on the boring logs are generally made in accordance with the "Unified Soil Classification System."

GENERAL SITE CONDITIONS

The project site is located along the top of a ridge on the southerly side of Punanani Gulch, about 1-1/2 miles northeast of the intersection of Kaahumanu Street and Moanalua Road.

Annual Rainfall

The average annual rainfall over the area varies from about 40 to 50 inches.

Topography

The ground elevation generally varies from about 450 to 700 ft. The site generally slopes down toward the south and southwest at gradients ranging from about 12% to 30% with localized steeper sections at about 40% or steeper.

The adjacent areas on the south (near the lower slope of the natural gulch) are generally steeper with gradients of about 50% or steeper.

A haul road was noted along the southwesterly boundary. It appears that the road bed has been benched into the side slope by cutting and filling into the top of slope. Miscellaneous fill may have been placed along the outer portion of the roadway or shoulder area. The outside face of the slope appeared generally steep and loose with some buried vegetation in localized pockets.

The northern boundary follows along the top of the slope above Punanani Gulch. Localized slopes of 50 to 100% may be noted at the easterly end of the site.

Other General Features

Most of the site was a former sugarcane field. Haul roads and irrigation ditches cross the site. An irrigation ditch about 3 to 5 ft deep and about 6 to 8 ft wide crosses the middle portion of the site generally in an east to west direction at about the 536 to 545-ft contour. The banks of the ditch and the bottom of the ditch appeared to be loose.

The vegetative covers on the site include sugarcane, tall grass and trees. Trees about 30 to 40 ft were noted on the eastern portion of the site. Some access trails were cleared for boring sites in the easterly portion of the site.

INTERPRETATION OF SOIL CONDITIONS

From the field exploration and laboratory test results, the soils encountered in the borings may be generally approximated as follows:

Stiff to hard, reddish-brown to brown clayey silts and silty clays to about 5 to 15-ft depths followed by stiff, mottled gray-brown clayey silt to about 20 ft, the maximum depth drilled.

Some rocks were encountered at Boring Nos. 17, 18 and 19 at about 10 to 15-ft depths.

Localized pockets of clay (CH soils) were encountered in some of the borings.

Water was not noted in the borings during the field explorations.

For more detailed descriptions of soils encountered in the drill holes, refer to the boring logs.

Variations to the above soil and water conditions are to be expected between borings and in localized areas.

DISCUSSION AND RECOMMENDATIONS

The present plan is to clear and grade the site for residential development.

Preliminary plans generally indicate cuts from little to about 15 ft in height generally in the northern portion and fills from little to about 25 ft in height generally in the southerly portion of the site.

Placing of fills on sloping ground should be done with care by the contractor. Fills on fairly steep slopes (about 3:1 or steeper) should generally be avoided.

Cast-over miscellaneous materials along the outer shoulder of the haul road along the southwesterly boundary should be removed where practicable.

Rocks or boulders were encountered at about 10 to 15-ft depths in some borings. Because of the shallow depths to decomposed rocks, boulders should be anticipated to be interspersed over the site. The closer an excavation approaches decomposed rocks, the greater will be the quantity of boulders. Boulders may be used to construct fill slopes outside of house lots, see Figure 1. Otherwise, some provisions should be made for hauling costs.

Site Grading

Surface vegetation, rubbish, loose fills and miscellaneous debris should be cleared and removed prior to site grading. Localized hard and soft pockets encountered during the site preparations should be excavated and replaced with select soils compacted in thin lifts.

In general, the on-site soils may be used for the construction of the proposed fills. Clayey soils, when detected, should generally be placed in fills over fairly level areas away from the face of slopes and outside of building pads.

Grading work should be done in accordance with the Revised Ordinances of Honolulu, 1969 As Amended; and as recommended below:

1. The area should be cleared and grubbed.

2. Topsoil and stockpiled soils should be stripped to stiff natural ground before the placement of fills.

   Thin layers of loose surface soils near finish grade should be scarified and recompacted.

3. Hard surfaces along existing haul roads should be scarified down to stiff soils and recompacted to match the density of the surrounding soil.

4. In gullies, drainageways and irrigation ditches, loose material at the bottoms and sides should be stripped down to stiff natural ground. Trenches should be cut in a herringbone pattern along the bottoms and sides of natural drainageways and subdrains placed in the trenches to provide drainage paths before the placement of any fills. The locations of subdrains should be determined in the field after clearing and grubbing.

5. Fills should be constructed in approximately level layers starting at the lower end and working upward. Where fills are made on sloping areas steeper than 5 horizontal to 1 vertical, the ground at the toe of the fill should be benched to a generally level condition. As the fill is brought up, it should continually be keyed into the stiff natural ground by cutting steps into the slopes and compacting the fill into these steps.

6. Thin sidehill fills (sliver fills) on sloping areas should be avoided. The grading work proposed in the southerly area where fills as high as 20 ft are contemplated should be done with care.

7. If boulders are proposed to be used in the construction of fills, they generally should be placed along the toe sections of fill slopes and outside of probable building sites. Before placing the boulders, the subgrade should be stripped to stiff natural ground and shaped to drain. A transition layer of select granular material (6-in. to dust sizes) should be placed on the subgrade and

the boulders placed on the select material. Earth fill may be used in the void spaces between boulders. A transition layer of select granular material should be placed against the boulders before earth fills are placed against the boulders. See attached sketch, Figure 1.

8. In general, fills should be laid in 6-in. compacted layers to 90% of the maximum density determined by the ASTM D 1557-70 test method. In roadway areas, the top 2 ft of fill should be compacted to 95% of the maximum density.

9. Provisions to drain the site during and after the completion of grading operations should be included.

Slopes

In general, cut and fill slopes of 2 horizontal to 1 vertical or flatter should be used.

For slope heights (top to toe) greater than 15 ft, 8-ft-wide benches should be placed at height intervals of about 15 ft. Slopes should be limited to about 30 ft in height, wherever practicable.

To lessen erosion, the runoff from rainstorms should be diverted by berms or ditches away from slopes whenever practicable.

The surface of fill slopes should be compacted by cat-tracking or with a sheepsfoot roller.

Slope planting is recommended on cut and fill slopes to minimize erosion.

Slope adjustments or other precautions should be considered if seepage zones or expansive clay pockets are encountered in localized areas. In general, when clay pockets are detected in cut slopes, the slopes should be adjusted by flattening the slope or by removing a section of the clay "CH" soils and reconstructing the slopes with selected granular material compacted in thin lifts. The actual remedial measures may be adjusted according to field conditions.

Regrading of slopes, cutting and removing the toes of slopes, constructing walls and structures on slopes, placing utility trenches on slopes or along the toes of slopes, etc., can cause instability problems. These conditions will require special attention, otherwise, field adjustments may be required when they are detected.

Foundations for Preliminary Designs

In general, one and 2-story, split-level, residential buildings are proposed.

At present, wood-frame structures on beam-on-post type foundations are contemplated.

Beam-on-post and pier foundations are recommended as a general foundation system over the site.

In general, slab-on-ground type construction should be considered only on fairly level lots with the structure located about 15 ft or more away from the top of slope.

Where the topography is steep (over 30%), or the structures contemplated are relatively large or odd shaped, the design of foundations should be adjusted for the structure planned and for actual field conditions on each lot.

In general, flexible type superstructures should be designed to tolerate and resist some differential movements. Masonry and stucco walls should be avoided as much as practicable since small movements may cause some cracking.

In localized areas, some clayey or expansive soils may be encountered. Adjustments should be made in the field wherever expansive soils are detected.

Other general guidelines for preliminary foundation design considerations are as follows:

1. Footings should be placed on piers or blocks that extend about 2 ft into existing stiff ground or into well-compacted fill where the finished ground slopes from about 10 to 20%.

   For slopes greater than about 20% but less than about 30%, deeper foundations are recommended, except where rocks are encountered.

   For slopes greater than 30%, the foundations should be designed on an individual lot basis.

2. Soft spots or pockets of loose material encountered below the building area should be excavated and replaced with select on-site soil or well-graded granular material or other approved material compacted in thin lifts.

3. Bearing values for a given soil usually vary with the size and depths of footings. For the proposed residential structures, bearing values of about 2000 p.s.f. may be used for footings on stiff natural ground or on compacted fill, provided the foundations rest on fairly level ground away from the tops of slopes.

4. Concrete slabs on ground should be placed over a base course of 4 in. of well-graded gravel less than 3/4-in. and greater than 1/4-in. in size or over some form of capillary break. The subgrade should be compacted and shaped to a level surface or to drain, if practicable, and generally should be kept slightly higher than the finish grade of the outside of the houses.

5. Where slab-on-ground construction will be over the deeper fills, construction should be delayed as long as practicable to allow the fills and subsoils to adjust to the new load conditions.

6. Where clay "CH" soils are encountered near the surface, the foundation treatment should be adjusted on a case by case basis.

   In general, for slab-on-ground construction over clayey soils, the surface clay (CH soil) should be removed and replaced to a depth of 3 ft with select non-expansive soil below the slab. Prior to placing and compacting the selected soil, the moisture content of the clay soils at the bottom of the excavation should be on the wet side of optimum moisture (preferably

the wet side of the plastic limit) and not allowed to dry-out to lessen the heave potential of the soil.

7. If practicable, particularly where clayey soils are detected, flexible superstructures should be designed to accommodate some up and down movements of the ground surface resulting from environmental or weather changes.

8. Foundations located over or adjacent to a utility trench should be designed to span over the trench or the footings should extend below the bottom of the trench.

9. Construction of retaining walls on slopes should generally be avoided.

10. Good surface drainage away from the foundations of structures should be maintained and the site should be graded to prevent the ponding of water.

Joint Details

To lessen the heave or wavy surface effects at the ground floor level, non-bearing partitions, doors, cabinets, etc., should be designed with loose fits and other precautions taken to allow for some future adjustments or maintenance.

Roadway

In general, for light automobile traffic and drained subgrade conditions, an estimate of the roadway pavement thickness for the general soil conditions may be as follows:

1. Wearing course - 2-in. asphaltic concrete.

2. Base course - 6-in. base course.

3. Select borrow subbase - 6-in. select borrow over a prepared subgrade.

Provisions should be made in the contract documents to allow for local adjustments regarding select borrow subbase and borrow requirements in the field in accordance with the design standards of the City and County of Honolulu. In fill areas, the use of select soils within the top 2 to 3 ft of the subgrade may reduce the thickness of or eliminate the need for the select borrow subbase or borrow courses.

The subgrade should be compacted and shaped to drain. To avoid the ponding of water and softening of the subgrade at low points, weep holes should be placed at subgrade levels thru the walls of catch basins which are placed in these low areas.

Utilities

Utilities should be placed after the fills are constructed. The bottoms of utility trenches should be daylighted at low points and graded to drain water, particularly near the tops and toes of slopes. The backfill of trenches should be well compacted, particularly at the toes of slopes.

Utility lines should be designed with flexible joints particularly where lines are connected to structures.

Unforeseen Conditions

Because of the variability of soil deposits, site improvements, designs and construction techniques, existing or changed conditions may be encountered that cannot be foreseen with even the most exhaustive studies of site and project conditions. These unforeseen conditions should be recognized when encountered and then evaluated so that the designs or the construction methods may be modified accordingly, if necessary.

Unforeseen or changed or undetected conditions such as soft spots, new or existing utility trenches, underground structures, pipes, voids or cavities, cesspools, boulders, expansive soil pockets, rubbish or boulder disposal pits, seepage water or water level changes with weather, etc., may occur in localized areas and will have to be adjusted and corrected in the field as they are detected.

Site Regrading

After mass grading work is done and cuts and fills are made according to the grading plans, regrading at some future date should be avoided unless done under the guidance of a Soils Engineer.

Review of Plans, Specifications and Construction

Our basic scope of work does not include review of plans, specifications and construction observations.

It is recommended that the soil and foundation engineer review the final plans and specifications for general conformance with the earthwork and foundation design guidelines of the soil report.

It is also recommended that the soil and foundation engineer be retained to provide engineering services during the foundation phases of the work. This will allow the soil engineer to observe general compliance with the design concepts, specifications or recommendations and to allow design changes in the event that subsurface conditions differ from that anticipated prior to start of construction.

In the event that changes in the nature, design or location of the project are planned, the recommendations contained in this report shall not be considered valid unless the changes are reviewed and the contents of this report modified or verified in writing.

PROPOSED SPECIFICATION FOR EARTHWORK

NEWTOWN ESTATES - UNIT IV

I. GENERAL GRADING REQUIREMENTS

Grading work shall conform to Chapter 23 of Revised Ordinances of Honolulu, 1969 as amended.

II. SPECIFICATIONS FOR ON-SITE EARTHWORK

A. Scope of Work

The work to be performed under these specifications includes the furnishing of all labor, materials, tools and equipment for the earthwork at Newtown Estates - Unit IV. The work includes the preparation of the site, the excavation of materials and the placement of fill materials in accordance with the specifications and applicable plans, together with guidelines included in the preliminary soil report for this project.

B. Soil Engineer

The services of a soil testing firm shall be used. A soil technician shall be present at the site on an intermittent basis to observe grading progress and to take density tests.

A reasonable time shall be alloted to perform field and laboratory tests prior to the placement of additional fill.

The density test results shall be transmitted to the Contractor and to Community Planning, Inc. Where low density test results are noted, the area shall be rerolled by the Contractor and retested by the Soils Engineer if, in his opinion, a test is necessary.

If the field observations and test results, in the opinion of the Soils Engineer, indicate that the earthwork is not in general conformance to the intent of the plans and soil report, the discrepancy shall be reported to the Contractor and the project representative from Community Planning, Inc. for corrective action.

C. Clearing, Grubbing and Preparing Areas to be Filled

Vegetation, rubbish and miscellaneous material shall be removed and disposed of, leaving the disturbed area with a neat, debris-free appearance.

Topsoil, stockpiled soils and localized soft pockets shall be stripped to stiff natural ground before the placement of fills. Loose surface soils encountered at finish grade shall be scarified and recompacted.

Hard surfaces such as access roadways, haul roads, etc., shall be scarified to a depth of about 12 in. and recompacted to approximately match the density of the surrounding soils.

The bottoms and sides of gullies, drainage or irrigation ditches shall be stripped down to stiff natural ground.

Subdrains shall be placed along the bottoms and sides of natural drainageways or dips before the placement of fills. The locations of subdrains should be determined in the field after clearing and grubbing.

Silting basins shall be drained and loose and soft soils shall be stripped down to stiff ground and the backfill shall be compacted in accordance with Section II-D, "Placing, Spreading and Compacting Fill Material."

Where fills are constructed on sloping areas steeper than about 5 horizontal to 1 vertical, the ground at the toe of the fill shall be benched to a generally level condition. As the fill is constructed in approximately level layers, it shall continually be keyed into the stiff natural ground by cutting steps into the slopes and compacting the fill into these steps.

Known abandoned utility lines and abandoned lines encountered during construction shall be removed and the trench recompacted to approximately match the density of the surrounding area but generally not less than 90% of ASTM D 1557-70 maximum density. Field adjustments may be considered where deep utility lines are encountered.

D. Materials

Fill material shall consist of selected on-site soils or approved borrow soils. The soils shall contain no more than a trace of organic and deleterious matter.

Borrow soils shall be selected soils generally less than 6-in. maximum size, with more than about 30% fines and a plasticity index generally less than about 20.

Fill material placed in the top 2 ft of fills should generally be less than about 3-in. maximum size with more than about 30% fines.

E. Placing, Spreading and Compacting Fill Material

The selected fill material shall be placed in level layers which, when compacted, shall not exceed 6 inches. Each layer shall be spread evenly and blade-mixed during the spreading to attain uniformity of material and water content within each layer.

Rocks or cobbles shall not be allowed to nest and voids between rocks shall be filled and compacted with small stones or earth.

When the water content of the fill material is well below the optimum for compacting purposes, water shall be added until the water content is near the optimum.

When the water content of the material is well above the optimum for compacting purposes, the fill material shall be aerated by blading or by other satisfactory methods until the water content is near the optimum.

After each layer has been placed, mixed and spread evenly, it shall be compacted to 90% of maximum density in accordance with ASTM D 1557-70 or other comparable density tests. For fills in roadway areas, the top 2 ft of fill shall be compacted to 95% of the maximum density.

Compaction shall be with sheepsfoot rollers, multiple-wheel pneumatic-tired or other acceptable rollers which shall be able to compact the fill to the specified density. Rolling shall be accomplished while the fill material is at the specified water content. The rolling of each layer shall be continuous over its entire area and the roller shall make sufficient passes to obtain the desired density.

Field density tests shall be made to get an indication of the compaction of the fill. Where sheepsfoot rollers are used, the soils may be disturbed to a depth of several inches. Density readings shall be taken in the compacted material below the disturbed surface. When these readings indicate that the density of any layer of fill or portion thereof is below the required density, that layer or portion shall be reworked until the required density has been obtained.

The fill operation shall be continued in 6-in. compacted layers, as specified above, until the fill has been brought to the finished slopes and grades as shown on the accepted plans.

F. Slope Adjustments

If clay soils are encountered in cut slopes, the slopes shall be adjusted by use of flatter slopes or by removing a section of the clay "CH" soils along slopes and reconstructing the slopes with select granular materials. The actual remedial measures will depend upon field conditions.

G. Boulder Fills

If boulders are used for the construction of fills, they shall be generally placed along the toe sections of slopes and outside of probable building sites. The subgrade shall be stripped to stiff natural ground, shaped to drain and a transition layer of select granular material (maximum 6-in. to dust sizes) shall be placed on it. Earth fill may be used in the void spaces between boulders. A transition layer of select granular material shall be placed against the boulder fill before construction of fills.

H. Excess Boulders

Excess boulders not used for construction shall be removed from the project site by the Contractor.

I. Excavation

Suitable material from excavation shall be used in the fill and unsuitable material from excavation shall be disposed of off the site.

J. Unforeseen Conditions

If unforeseen or undetected soil conditions such as soft spots, new and existing utility trenches, structure foundations, voids or cavities, boulders, seepage water or expansive soil pockets, etc., are encountered, corrective measures shall be made in the field as they are detected.

K. Rainy Weather

Fill material shall not be placed, spread or rolled during unfavorable weather conditions. When the work is interrupted by heavy rain, fill operations shall not be resumed until field conditions indicate that the water content and density are near that previously specified.

FIELD LOGS/BORING LOGS

A field log was prepared for each boring by our technician. The log contains drilling information and the technician's interpretation of the soil conditions between samples. The copies are kept on file in our office for one year.

We must emphasize that our recommendations are based on the boring logs included in this report and the information contained thereon and not on the field logs.

The boring logs in this report represent our interpretation of the contents of the field logs, and the results of the laboratory observations and tests of the field samples.

The stratification lines shown on each of the boring logs represent the approximate boundary between soil types and the transitions may or may not be gradual.

Symbols

Soil symbols used generally are in accordance with the Unified Soil Classification System.

Where a parenthesis "(MH)" is used, the soil sample was classified by visual observation of the sample recovered.

Where no parenthesis "MH" is used, the soil sample was classified from either the Atterberg limit or grain-size analysis test results.

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2" SS - 2" STANDARD SPLIT SPOON
3" S - 3" O.D. THIN WALL TUBE

BORING NO. 1 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date JUNE 14, 1976
Field Party MEYER, ASATO
Type of Boring AUGER (CME 55) Diam. 4"
Elev. 598'± * Datum —
Drill Bit T.C. FINGER

Water Level	NOT NOTICED			
Time	—			
Date	6-19-76			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40	PENETRATION DATA: 3" O.D. THIN WALL TUBE
	ELEV.: 598'±	0									
(MH)	STIFF REDDISH BROWN CLAYEY SILT		2"SS	1-A	–	27	–	–	–		57
MH-ML	STIFF, TAN BROWN CLAYEY SILT		2"SS	1-B	–	36	– LL= 50 PL= 36	–	–		
		5									
(MH)	STIFF, BROWN SILTY CLAY		3"S	1-C	108	48	73	2650	–		HYDRAULIC PRESSURE 300 PSI/1.3'
		10									
(MH)	STIFF, BROWN CLAYEY SILT		2"SS	1-D	–	46	–	–	–		
		15									
(MH)	MEDIUM, BROWN CLAYEY SILT		3"S	1-E	104	51	69	1640	72000		HYDRAULIC PRESSURE 250 PSI/1.0'
		20									
(MH)	STIFF, MOTTLED LIGHT GRAY BROWN SILTY CLAY		2"SS	1-F	–	49	–	–	–		
	END OF BORING @ 21.5' 6-14-76										

NOTE:
LL= LIQUID LIMIT
PL= PLASTIC LIMIT

* Elevation estimated from grading plan by Community Planning, Inc.

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2"SS-2"STANDARD SPLIT SPOON
3"S - 3"O.D. THIN WALL TUBE

BORING NO. 2 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date JUNE 14, 1976
Field Party MEYER, ASATO
Type of Boring AUGER (CME 55) Diam. 4"
Elev. 606'± * Datum —
Drill Bit T.C. FINGER
Water Level NOT NOTICED
Time —
Date 6-14-76

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40 / 3"O.D. THIN WALL TUBE
	ELEV.: 606'± *	0								
(MH)	STIFF, REDDISH BROWN CLAYEY SILT		2"SS	2-A	—	25	—	—	—	40
(MH)	STIFF, MOTTLED BROWN CLAYEY SILT		3"S	2-B	111	38	81	920	—	HYDRAULIC PRESSURE 350 PSI/1.0'
		5								
(MH)	STIFF MOTTLED GRAY TAN CLAYEY SILT		2"SS	2-C	—	42	—	—	—	
(MH)	STIFF, BROWN SILTY CLAY W/DECOMPOSED ROCK	10	3"S	2-D	107	44	75	2230	—	HYDRAULIC PRESSURE 600 PSI/0.7'
		15	2"SS	2-E	—	47	—	—	—	
(MH)	STIFF, MOTTLED TAN SILTY CLAY									
		20	2"SS	2-F	—	48	—	—	—	
	END OF BORING @ 21.5' 6-14-76									

* Elevation estimated from grading plan by Community Planning, Inc.

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

BORING NO. 3 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date JUNE 15, 1976
Field Party MEYER, AGATO
Type of Boring AUGER (CME 55) Diam. 4"
Elev. 636'± * Datum —
Drill Bit T.C. FINGER

HAMMER:
Weight 140#
Drop 30"
SAMPLER: 2"SS - 2" STANDARD SPLIT SPOON
3"S - 3" O.D. THIN WALL TUBE

Water Level					
	NOT NOTICED				
Time	—				
Date	6-15-76				

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test, N (Blows per foot) 0 10 20 30 40 / 3" O.D. THIN WALL TUBE
	ELEV. = 636'± *	0								
			2"SS	3-A	—	28	—	—	—	
			2"SS	3-B	—	32	—	—	—	
(MH)	STIFF TO HARD REDDISH BROWN CLAYEY SILT	5	3"S	3-C	105	35	78	4980	>2000	HYDRAULIC PRESSURE: 400 PSI/1.0'
		10	2"SS	3-D	—	37	—	—	—	
(MH)	STIFF, MOTTLED GRAY BROWN SILTY CLAY	15	2"SS	3-E	—	39	—	—	—	
		20	2"SS	3-F	—	30	—	—	—	
(MH)	STIFF, MOTTLED TAN GRAY CLAYEY SILT									
		25	2"SS	3-G	—	34	—	—	—	41
	STIFF, TAN GRAY BROWN CLAYEY SILT									
	END OF BORING @ 26.5' 6-15-76									

* Elevation estimated from grading plan by Community Planning, Inc.

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2" STANDARD SPLIT SPOON

BORING NO. 4 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date JUNE 15, 1976
Field Party MEYER, ASATO
Type of Boring AUGER (CME 55) Diam. 4"
Elev. 670'± * Datum —
Drill Bit T.C. FINGER

Water Level				
Time	—			
Date	6-15-76			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test, N (Blows per foot) 0 10 20 30 40
	ELEV. = 670'± ↓ *	0								
(MH)	HARD, REDDISH BROWN CLAYEY SILT			4-A	—	26	—	—	—	67
				4-B	—	33	—	—	—	54
		5		4-C	—	40	—	—	—	40
MH	HARD, MOTTLED BROWN CLAYEY SILT						LL= 77 PL= 43			
		10		4-D	—	32	—	—	—	
							LL= 64 PL= 42			
		15		4-E	—	34	—	—	—	44
MH	STIFF MOTTLED TAN GRAY CLAYEY SILT									
		20		4-F	—	43	—	—	—	
		25		4-G	—	59	—	—	—	
(CH)	STIFF MOTTLED GRAY BROWN CLAY									
	END OF BORING @ 26.5' 6-15-76									

NOTE:
LL= LIQUID LIMIT
PL= PLASTIC LIMIT

* Elevation estimated from grading plan by Community Planning, Inc.

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

BORING NO. 5 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date JUNE 15, 1976
Field Party MEYER, ASATO
Type of Boring AUGER (CME 55) Diam. 4"
Elev. 694'± * Datum —
Drill Bit T.C. FINGER

HAMMER:
Weight 140#
Drop 30"
SAMPLER: 2"SS - 2" STANDARD SPLIT SPOON
3"S - 3" O.D. THIN WALL TUBE

Water Level				
Time	—			
Date	6-15-76			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40 / 3" O.D. THIN WALL TUBE
	ELEV. = 694'± *	0								
MH	STIFF, BROWN CLAYEY SILT		2"SS	5-A	—	29	—	—	—	
			2"SS	5-B	—	34	—	—	—	
							LL=	57		
							PL=	40		
		5	3"S	5-C	106	36	78	1860	—	HYDRAULIC PRESSURE 400 PSI/1.0'
		10								
CH	STIFF, MOTTLED TAN CLAY		2"SS	5-D	—	38	—	—	—	
							LL=	123		
							PL=	45		
		15								
			2"SS	5-E	—	48	—	—	—	
		20								
			2"SS	5-F	—	46	—	—	—	
(MH)	STIFF MOTTLED REDDISH BROWN SILTY CLAY									
		25								
(CH)	STIFF MOTTLED GRAY BROWN CLAY		2"SS	5-G	—	52	—	—	—	
	END OF BORING @ 26.5' 6-15-76									

NOTE:
LL: LIQUID LIMIT
PL: PLASTIC LIMIT

* Elevation estimated from grading plan by Community Planning, Inc.

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2"SS-2"STANDARD SPLIT SPOON
3"S - 3"O.D. THIN WALL TUBE

BORING NO. G Sheet No. ____ of ____
Driller W.LUM ASSOC., INC. Date JUNE 29, 1976
Field Party MEYER, ASATO
Type of Boring AUGER (CME 55) Diam. 4"
Elev. 534'± * Datum —
Drill Bit T.C. FINGER

Water Level				
Time	—			
Date	6-29-76			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40	PENETRATION DATA: 3"O.D. THIN WALL TUBE
	ELEV. = 534'± *	0									
CH	STIFF, BROWN CLAY		2"SS	G-A	—	33	—	—	—		
							LL= 75				
							PL= 30				
			3"S	G-B	122	33	92	5090			HYDRAULIC PRESSURE 320 PSI/0.8'
		5									
(MH)	STIFF, MOTTLED BROWN CLAYEY SILT W/DECOMPOSED ROCK		2"SS	G-C	—	51	—	—	—		
		10									
			2"SS	G-D	—	47	—	—	—		
(MH)	STIFF MOTTLED GRAY BROWN CLAYEY SILT W/DECOMPOSED ROCK										
		15									
			2"SS	G-E	—	40	—	—	—		42
	DECOMPOSED ROCK										
(MH)	MEDIUM TO STIFF MOTTLED GRAY BROWN CLAYEY SILT	20									
			2"SS	G-F	—	52	—	—	—		
	END OF BORING @ 21.5' 6-29-76										

NOTE:
LL: LIQUID LIMIT
PL: PLASTIC LIMIT

* Elevation estimated from grading plan by Community Planning, Inc.

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER: Weight 140# Drop 30"
SAMPLER: 2" SS - 2" STANDARD SPLIT SPOON 3" S - 3" O.D. THIN WALL TUBE

BORING NO. 7 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date JUNE 24, 1976
Field Party SUZUKI, ASATO
Type of Boring AUGER (CME 55) Diam. 4"
Elev. 576'± * Datum —
Drill Bit T.C. FINGER
Water Level NOT NOTICED
Time —
Date 6-24-76

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.
	ELEV. = 576'± *	0							
(MH)	STIFF, BROWN SILTY CLAY		2"SS	7-A	-	32	-	-	-
			2"SS	7-B	-	32	-	-	-
(MH-CH)	HARD, REDDISH BROWN SILTY CLAY	5	3"S	7-C	-	33	-	-	-
			2"SS	7-D	-	32	-	-	-
		10	3"S	H 7-E	114	39	82	4190	-
(MH-CH)	STIFF MOTTLED GRAY BROWN SILTY CLAY	15	2"SS	7-F	-	44	-	-	-
		20	2"SS	7-G	-	38	-	-	-
	END OF BORING @ 21.5' 6-24-76								

PENETRATION DATA
Standard Penetration Test | 3" O.D. THIN WALL TUBE
N (Blows per foot) 0 10 20 30 40

51
HYDRAULIC PRESSURE 750 PSI/0.3'
68
HYDRAULIC PRESSURE 750 PSI/0.2'
43

* Elevation estimated from grading plan by Community Planning, Inc.

NEWTOWN - UNIT 4

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight: 140 #
Drop: 30"
SAMPLER: 2"SS - 2" STANDARD SPLIT SPOON
3"S - 3" O.D. THIN WALL TUBE

BORING NO. 8 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date JUNE 23 & 24, 1976
Field Party SUZUKI, ASATO
Type of Boring AUGER (CME 55) Diam. 4"
Elev. 626'± Datum —
Drill Bit T.C. FINGER
Water Level NOT NOTICED
Time —
Date 6-23-76

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40	PENETRATION DATA: 3" O.D. THIN WALL TUBE
	ELEV. = 626'± *	0									
(MH)	STIFF, REDDISH BROWN SILTY CLAY		2"SS	B-A	–	33	–	–	–		
			3"S	B-B	99	33	75	–	860 880		HYDRAULIC PRESSURE, 650 PSI/1.5
(MH)	STIFF, REDDISH BROWN CLAYEY SILT	5	2"SS	B-C	–	35	–	–	–	46	
		10									
(MH)	STIFF MOTTLED BROWN CLAYEY SILT		3"S	B-D	102	40	73	1890	1020 1020		HYDRAULIC PRESSURE, 500 PSI/1.5
		15	2"SS	B-E	–	52 42	–	–	–		
(MH)	STIFF MOTTLED GRAY BROWN SILTY CLAY	20									
			2"SS	B-F	–	46	–	–	–		
	END OF BORING @ 21.5' 6-24-76										

* Elevation estimated from grading plan by Community Planning, Inc.

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

BORING NO. 9 Sheet No. ____ of ____
Driller W.LUM ASSOC., INC. Date JUNE 23, 1976
Field Party SUZUKI, ASATO
Type of Boring AUGER (CME 55) Diam. 4"
Elev. 646'± * Datum —
Drill Bit T.C. FINGER

HAMMER:
Weight 140#
Drop 30"
SAMPLER: 2" SS-2" STANDARD SPLIT SPOON
3" S - 3" O.D. THIN WALL TUBE

Water Level				
Time	—			
Date	6-23-76			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40 / 3" O.D. THIN WALL TUBE
	ELEV. = 646'± *	0								
(MH)	STIFF, REDDISH BROWN CLAYEY SILT		2"SS	9-A	–	29	–	–	–	
			3"S	9-B	93	33	70	–	2000 1800	HYDRAULIC PRESSURE 300 PSI/1.5'
		5	2"SS	9-C	–	37	–	–	–	48
		10	2"SS	9-D	–	35	–	–	–	55
(MH-GH)	STIFF MOTTLED GRAY BROWN SILTY CLAY	15	2"SS	9-E	–	47	–	–	–	
		20	3"S	9-F	94	45	65	2930	–	HYDRAULIC PRESSURE 650 PSI/1.5'
	END OF BORING @ 21.5' 6-23-76									

* Elevation estimated from grading plan by Community Planning, Inc.

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2"SS-2" STANDARD SPLIT SPOON
3"S - 3" O.D. THIN WALL TUBE

BORING NO. 10 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date JUNE 23, 1976
Field Party SUZUKI, ASATO
Type of Boring AUGER (GME 55) Diam. 4"
Elev. 680'± * Datum —
Drill Bit T.C. FINGER

Water Level	NOT NOTICED			
Time	—			
Date	6-23-76			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40 / 3" O.D. THIN WALL TUBE
	ELEV. = 680'± *	0								
(MH)	STIFF, REDDISH BROWN CLAYEY SILT		2"SS	10-A	—	39	—	—	—	
			2"SS	10-B	—	38	— LL= 101 PL= 42	—	—	57
MH-CH	STIFF MOTTLED GRAY BROWN SILTY CLAY	5	3"S	10-C	119	35	88	5610	1100	HYDRAULIC PRESSURE 750 PSI/1.0'
(MH)	STIFF MOTTLED TAN GRAY CLAYEY SILT	10	2"SS	10-D	—	32	—	—	—	45
		15	2"SS	10-E	—	41	—	—	—	
(MH-CH)	STIFF MOTTLED GRAY BROWN SILTY CLAY									
		20	2"SS	10-F	—	39	—	—	—	
	END OF BORING @ 21.5' 6-23-76									

NOTE:
LL= LIQUID LIMIT
PL= PLASTIC LIMIT

* Elevation estimated from grading plan by Community Planning, Inc.

NEWTOWN - UNIT 4

WALTER LUM ASSOCIATES, INC. [redacted] 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2"SS-2" STANDARD SPLIT SPOON
3" S-3" O.D. THIN WALL TUBE

BORING NO. 11 Sheet No. ____ of ____
Driller W.LUM ASSOC., INC. Date JUNE 8, 1976
Field Party MEYER, SUZUKI, ASATO
Type of Boring AUGER (CME 55) Diam. 4"
Elev. 506'± * Datum —
Drill Bit T.C. FINGER

Water Level				
NOT NOTICED				
Time —				
Date 6-8-76				

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40	PENETRATION DATA: 3" O.D. THIN WALL TUBE
	ELEV.= 506'±*	0									
			2"SS	II-A	-	29	-	-	-		
			2"SS	II-B	-	29	-	-	-		
CH	STIFF TO HARD REDDISH BROWN CLAY	5	2"SS	II-C	-	30	LL= 86 PL= 32	-	-		40
			2"SS	II-D	-	33	-	-	-		
		10	2"SS	II-E	-	30	-	-	-		43
(MH)	RED CLAYEY SILT W/ GRAY CLAY STREAKS	15	3"S	II-F	133	35	98	-	>2000		HYDRAULIC PRESSURE 400 PSI/0.5'
	STIFF MOTTLED REDDISH BROWN SILTY CLAY	20	2"SS	II-G	-	43	-	-	-		40
	END OF BORING @ 21.5' 6-8-76										

NOTE:
LL= LIQUID LIMIT
PL= PLASTIC LIMIT

* Elevation estimated from grading plan by Community Planning, Inc.

NEWTOWN - UNIT 4

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2"SS-2" STANDARD SPLIT SPOON
3"S-3" O.D. THIN WALL TUBE

BORING NO. 12 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date JUNE 7, 1976
Field Party MEYER, ASATO
Type of Boring AUGER (GME 55) Diam. 4"
Elev. 502'± * Datum —
Drill Bit T.C. FINGER

Water Level				
Time	—			
Date	6-7-76			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40 / 3" O.D. THIN WALL TUBE
	ELEV. = 502'± *									
MH-CH	STIFF, REDDISH BROWN SILTY CLAY	5	2"SS	12-A	—	27	— LL= 77 PL= 35	—	—	
			2"SS	12-B	—	30	—	—	—	
(MH)	HARD REDDISH BROWN SILTY CLAY W/ GRAY CLAY STREAKS	10	2"SS	12-C	—	29	—	—	—	43
		15	2"SS	12-D	—	48	—	—	—	
(MH)	STIFF MOTTLED GRAY BROWN SILTY CLAY	20	3"S	12-E	101	45	70	1330	—	HYDRAULIC PRESSURE 300 PSI / 1.0
	END OF BORING @ 21' 6-7-76									

NOTE:
LL= LIQUID LIMIT
PL= PLASTIC LIMIT

* Elevation estimated from grading plan by Community Planning, Inc.

WALTER LUM ASSOCIATES, INC. [redacted] 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2"SS - 2" STANDARD SPLIT SPOON
3" S - 3" O.D. THIN WALL TUBE

BORING NO. 13 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date JUNE 8, 1976
Field Party MEYER, SUZUKI
Type of Boring AUGER (CME 55) Diam. 4"
Elev. 505'± * Datum —
Drill Bit T.C. FINGER

Water Level					
Time	—				
Date	6-8-76				

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40	PENETRATION DATA: 3"O.D. THIN WALL TUBE
	ELEV. = 505'± *	0									
(MH)	STIFF, REDDISH BROWN SILTY CLAY		2"SS	13-A	–	33	–	–	–		
			2"SS	13-B	–	34	–	–	–		
		5	3"S	13-C	115	36	85	3930	1360		HYDRAULIC PRESSURE 600 PSI/1.0'
(MH)	MEDIUM-STIFF MOTTLED BROWN SILTY CLAY	10	2"SS	13-D	–	53	–	–	–		
		15	3"S	13-E	104	51 50	69	2770	–		HYDRAULIC PRESSURE 550 PSI/1.3'
(MH)	STIFF, REDDISH BROWN CLAYEY SILT										
(MH)	MEDIUM, MOTTLED BROWN CLAYEY SILT	20	2"SS	13-F	–	57	–	–	–		
	END OF BORING @ 21.5' 6-8-76										

* Elevation estimated from grading plan by Community Planning, Inc.

WALTER LUM ASSOCIATES, INC. [redacted] 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

BORING NO. 14 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date JUNE 28, 1976
Field Party SUZUKI, ASATO
Type of Boring AUGER (GME 55) Diam. 4"
Elev. 538'± Datum —
Drill Bit T.C. FINGER
Water Level NOT NOTICED
Time —
Date 6-28-76

HAMMER:
Weight 140#
Drop 30"
SAMPLER: 2"SS-2" STANDARD SPLIT SPOON
3"S - 3" O.D. THIN WALL TUBE

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.
	ELEV. = 538'± *	0							
(MH-CH)	STIFF, BROWN SILTY CLAY		2"SS	14-A	-	27	-	-	-
			2"SS	14-B	-	35	-	-	-
		5	3"S	14-C	117	33	88	-	1300, 1000
		10	2"SS	14-D	-	41	-	-	-
	STIFF MOTTLED GRAY BROWN	15							
(MH-CH)	SILTY CLAY		2"SS	14-E	-	41	-	-	-
		20							
			2"SS	14-F	-	52	-	-	-
	END OF BORING @ 21.5' 6-28-76								

PENETRATION DATA
Standard Penetration Test
N (Blows per foot) 0 10 20 30 40
3"O.D. THIN WALL TUBE

HYDRAULIC PRESSURE 800 PSI/0.8'

* Elevation estimated from grading plan by Community Planning, Inc.

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

BORING NO. 15 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date JUNE 25, 1976
Field Party SUZUKI, ASATO
Type of Boring AUGER (CME 55) Diam. 4"
Elev. 584'± * Datum —
Drill Bit T.C. FINGER

HAMMER:
Weight 140#
Drop 30"
SAMPLER: 2"SS - 2" STANDARD SPLIT SPOON
3"S - 3" O.D. THIN WALL TUBE

Water Level					
Time	—				
Date	6-25-76				

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40	PENETRATION DATA: 3" O.D. THIN WALL TUBE
	ELEV. = 584'± *	0	2"SS	15-A	–	33	–	–	–		
(MH)	STIFF, REDDISH BROWN CLAYEY SILT		3"S	15-B	110	35	81	8740	–		HYDRAULIC PRESSURE 800 PSI/1.2'
		5	2"SS	15-C	–	31	–	–	–		
(MH-CH)	STIFF, GRAY BROWN SILTY CLAY	10	2"SS	15-D	–	35	–	–	–		
(MH)	STIFF, TAN GRAY CLAYEY SILT	15	2"SS	15-E	–	42	–	–	–		
		20	2"SS	15-F	–	42	–	–	–		
	END OF BORING @ 21.5' 6-25-76										

* Elevation estimated from grading plan by Community Planning, Inc.

NEWTOWN - UNIT IV

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2"SS-2" STANDARD SPLIT SPOON
3"S-3"O.D. THIN WALL TUBE

BORING NO. 16 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date JUNE 8, 1976
Field Party MEYER, SUZUKI, ASATO
Type of Boring AUGER (CME 55) Diam. 4"
Elev. 476'± * Datum —
Drill Bit T.C. FINGER

Water Level				
Time	—			
Date	6-8-76			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40	PENETRATION DATA: 3"O.D. THIN WALL TUBE
	ELEV. = 476'± *	0									
(MH)	STIFF, REDDISH BROWN CLAYEY SILT		2"SS	16-A	–	29	–	–	–		
			2"SS	16-B	–	48	–	–	–		
(MH)	STIFF, MOTTLED BROWN SILTY CLAY	5	3"S	16-C	111	45	77	–	–		HYDRAULIC PRESSURE 600 PSI / 1.2'
(ML)	STIFF MOTTLED GRAY BROWN CLAYEY SILT W/TRACES OF DECOMPOSED ROCK	10	2"SS	16-D	–	39	–	–	–	54	
	GRAY DECOMPOSED ROCK	15	2"SS	16-E	NOT ENOUGH SAMPLE					25/0.07'	
(MH)	STIFF, MOTTLED REDDISH BROWN & GRAY CLAYEY SILT W/TRACES OF DECOMPOSED ROCK	20	2"SS	16-F	–	56	–	–	–		
	END OF BORING @ 21.5' 6-8-76										

* Elevation estimated from grading plan by Community Planning, Inc.

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2"SS - 2" STANDARD SPLIT SPOON
3"S - 3" O.D. THIN WALL TUBE

BORING NO. 17 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date JUNE 8, 1976
Field Party MEYER, SUZUKI
Type of Boring AUGER (CME 55) Diam. 4"
Elev. 454'± * Datum —
Drill Bit T.C. FINGER
Water Level NOT NOTICED
Time —
Date 6-8-76

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.
	ELEV.: 454'± *	0							
(MH-CH)	STIFF, BROWN SILTY CLAY		2"SS	17-A	—	29	—	—	—
MH	STIFF, REDDISH BROWN SILTY CLAY W/TRACES OF CANE ASH		2"SS	17-B	—	31	— LL= 72 PL= 37	—	—
		5	3"S	17-C	105	29	81	8000	1500
(MH)	STIFF, REDDISH BROWN SILTY CLAY W/TRACES OF DECOMPOSED ROCK								
		10	2"SS	17-D	ROCK FRAGMENTS				
	BLUE, ROCK								
		15	2"SS	17-E	ROCK FRAGMENTS				
	PUKA PUKA ROCK	20							
			2"SS	17-F	—	4	—	—	—
	END OF BORING @ 20.9' 6-8-76								

NOTE:
LL= LIQUID LIMIT
PL= PLASTIC LIMIT

PENETRATION DATA
Standard Penetration Test
N (Blows per foot) 0 10 20 30 40
3"O.D. THIN WALL TUBE

HYDRAULIC PRESSURE 400 PSI/1.5'
30%.2'
20%.0'
50%.4'

* Elevation estimated from grading plan by Community Planning, Inc.

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2"SS - 2" STANDARD SPLIT SPOON
3"S - 3" O.D. THIN WALL TUBE

BORING NO. 18 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date JUNE 10, 1976
Field Party MEYER, SUZUKI
Type of Boring AUGER (CME 55) Diam. 4"
Elev. 457'± * Datum —
Drill Bit T.C. FINGER

Water Level					
Time	—				
Date	6-10-76				

Water Level NOT NOTICED

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.
	ELEV. = 457'± *	0							
MH	STIFF, REDDISH BROWN SILTY CLAY W/ TRACES OF ORGANIC MATTER (CANE)		2"SS	18-A	—	30	— LL: 60 PL: 40	—	—
			2"SS	18-B	—	38	—	—	—
(MH)	MEDIUM DARK RED BROWN CLAYEY SILT W/ SOME ORGANIC MATTER (CANE)	5	3"S	18-C	106	44	74	550	640
(MH)	RED, GRAY & BROWN SILTY CLAY & DECOMPOSED ROCK	10	2"SS	18-D	—	46	—	—	—
		15	2"SS	18-E		NO RECOVERY			
	END OF BORING @ 15' 6-10-76								

PENETRATION DATA
Standard Penetration Test | 3" O.D. THIN WALL TUBE
N (Blows per foot) 0 10 20 30 40

HYDRAULIC PRESSURE 150 PSI / 1.5'

25/0.0'

HAMMER BOUNCES

NOTE:
LL: LIQUID LIMIT
PL: PLASTIC LIMIT

* Elevation estimated from grading plan by Community Planning, Inc.

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

BORING NO. 19 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date JUNE 10 & 14, 1976
Field Party MEYER, SUZUKI
Type of Boring AUGER (CME 55) Diam. 4"
Elev. 450'± * Datum —
Drill Bit T.C. FINGER

HAMMER:
Weight 140#
Drop 30"
SAMPLER: 2"SS-2" STANDARD SPLIT SPOON
3"S-3" O.D. THIN WALL TUBE

Water Level	NOT NOTICED	NOT NOTICED			
Time	—	—			
Date	6-10-76	6-14-76			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test / 3" O.D. THIN WALL TUBE — N (Blows per foot) 0 10 20 30 40
	ELEV.= 450'± *	0								
GH	STIFF, REDDISH BROWN CLAY W/DECOMPOSED ROCK		2"SS	19-A	—	33	LL= 96 PL= 30	—	—	55
			2"SS	19-B	—	40 42	—	—	—	
(MH-CH)	STIFF, MOTTLED BROWN CLAYEY SILT (DEC. ROCK) W/SOME GRAY CLAY	5	3"S	19-C	117	30	90	—	—	HYDRAULIC PRESSURE 600 PSI/0.6' TUBE SMASHED
					NOTE: MOVED 32' SOUTH.			HOLE		
	GRAY ROCK FRAGMENTS (BOULDER ?)	10	2"SS	19-D	—	9	—	—	—	65/0.5'
	EASY DRILLING									
	GRAY ROCK FRAGMENTS	15	2"SS	19-E	ROCK FRAGMENT					25/0.0' HAMMER BOUNCES
	END OF BORING @ 15' 6-14-76									

NOTE:
LL= LIQUID LIMIT
PL= PLASTIC LIMIT

* Elevation estimated from grading plan by Community Planning, Inc.

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2"SS - 2" STANDARD SPLIT SPOON
3"S - 3" O.D. THIN WALL TUBE

BORING NO. 20 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date JUNE 29, 1976
Field Party MEYER, ASATO
Type of Boring AUGER (CME 55) Diam. 4"
Elev. 500'± * Datum —
Drill Bit T.C. FINGER
Water Level NOT NOTICED
Time —
Date 6-29-76

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40	3" O.D. THIN WALL TUBE
	ELEV. = 500'± *	0									
(MH)	STIFF TO HARD REDDISH BROWN CLAYEY SILT		2"SS	20-A	—	31	—	—	—		
			2"SS	20-B	—	34	—	—	—		
		5	2"SS	20-C	—	47	—	—	—		
(MH)	STIFF TO HARD MOTTLED GRAY BROWN CLAYEY SILT										
		10	2"SS	20-D	—	51	—	—	—		
	STIFF, MOTTLED GRAY CLAYEY SILT	15	2"SS	20-E	—	40	—	—	—		
	MOTTLED GRAY DECOMPOSED ROCK	20	3"S	20-F	—	38	—	—	—		HYDRAULIC PRESSURE 400 PSI/0.3'
			2"SS	20-G	—	33	—	—	—		
	END OF BORING @ 21.8' 6-29-76										

* Elevation estimated from grading plan by Community Planning, Inc.

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

BORING NO. 21 Sheet No. ____ of ____
Driller W. LUM ASSOC., INC. Date JUNE 25, 1976
Field Party SUZUKI, ASATO
Type of Boring AUGER (CME 55) Diam. 4"
Elev. 542'± * Datum —
Drill Bit T.C. FINGER

HAMMER:
Weight 140#
Drop 30"
SAMPLER: 2" SS - 2" STANDARD SPLIT SPOON
3" S - 3" O.D. THIN WALL TUBE

Water Level	NOT NOTICED			
Time	—			
Date	6-25-76			

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.
	ELEV.: 542'± *	0							
CH-MH	STIFF, BROWN SILTY CLAY		2" SS	21-A	—	28	— LL= 71 PL= 33	—	—
			2" SS	21-B	—	33	—	—	—
		5	3" S	21-C	113	35	84	9420	—
		10	2" SS	21-D	—	37	— LL= 111 PL= 43	—	—
GH	STIFF TO HARD MOTTLED GRAY BROWN CLAY	15	2" SS	21-E	—	44	—	—	—
		20	2" SS	21-F	—	50	—	—	—
	END OF BORING @ 21.5' 6-25-76								

NOTE:
LL= LIQUID LIMIT
PL= PLASTIC LIMIT

PENETRATION DATA
Standard Penetration Test | 3" O.D. THIN WALL TUBE
N (Blows per foot) 0 10 20 30 40

HYDRAULIC PRESSURE 800 PSI/0.7'

* Elevation estimated from grading plan by Community Planning, Inc.

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

BORING NO. 22 Sheet No. ____ of ____

PROJECT NEWTOWN ESTATES - UNIT IV
Driller W.LUM ASSOC., INC. Date JUNE 29, 1976

LOCATION Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9
Field Party MEYER, ASATO

Type of Boring AUGER (CME 55) Diam. 4"
Elev. 461'± * Datum —
Drill Bit T.C. FINGER

HAMMER:
Weight 140#
Drop 30"
SAMPLER: 2"SS - 2" STANDARD SPLIT SPOON
3" S. 3" O.D. THIN WALL TUBE

Water Level					
Time	—				
Date	6-29-76				

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test / 3" O.D. THIN WALL TUBE — N (Blows per foot) 0 10 20 30 40
	ELEV. = 461'± *	0								
(MH)	STIFF, BROWN CLAYEY SILT		2"SS	22-A	—	49	—	—	—	
			2"SS	22-B	—	51	—	—	—	
		5	3"S	22-C	116	61	72	1640	1000 700	HYDRAULIC PRESSURE 320 PSI / 1.5'
(MH)	MEDIUM TO STIFF MOTTLED BROWN CLAYEY SILT									
		10	2"SS	22-D	—	62	—	—	—	
		15	2"SS	22-E	—	22	—	—	—	50/0.3'
	GRAY DECOMPOSED ROCK									
		20	2"SS	22-F	No RECOVERY					40/0.0'
	END OF BORING @ 20' 6-29-76									HAMMER BOUNCES

* Elevation estimated from grading plan by Community Planning, Inc.

WALTER LUM ASSOCIATES, INC. 3030 WAIALAE AVENUE • HONOLULU, HAWAII 96816 • PHONE 737-7931

Boring Log

PROJECT: NEWTOWN ESTATES - UNIT IV
LOCATION: Waimalu, Ewa, Oahu, Hawaii
Tax Map Key: 9-8-02: Por. 9

HAMMER:
Weight: 140#
Drop: 30"
SAMPLER: 2"SS-2"STANDARD SPLIT SPOON
3"S-3" O.D. THIN WALL TUBE

BORING NO. 23 Sheet No. ____ of ____
Driller W. LUM ASSOC, INC. Date JUNE 25, 1976
Field Party SUZUKI, ASATO
Type of Boring AUGER (CME 55) Diam. 4"
Elev. 514'± * Datum —
Drill Bit T.C. FINGER

Water Level					
Time	—				
Date	6-25-76				

Unified Soil Classification	DESCRIPTION	Depth (Ft.)	Sampler	Sample No.	Wet Dens. P.C.F.	Water Cont. %	Dry Dens. P.C.F.	Unconf. Comp. P.S.F.	Vane Shear P.S.F.	PENETRATION DATA: Standard Penetration Test N (Blows per foot) 0 10 20 30 40 / 3" O.D. THIN WALL TUBE
	ELEV. = 514'± *	0								
(MH)	STIFF, BROWN CLAYEY SILT		2"SS	23-A	—	27	—	—	—	
			2"SS	23-B	—	36	—	—	—	
		5	3"S	23-C	116	40	83	7270	—	HYDRAULIC PRESSURE 800 PSI / 1.5'
	COBBLE?									
	STIFF MOTTLED GRAY BROWN CLAYEY SILT & DECOMPOSED ROCK	10	3"S	23-D	90	29	70	—	—	HYDRAULIC PRESSURE 750 PSI / 1.2'
	DECOMPOSED ROCK									
(MH)	STIFF MOTTLED GRAY BROWN CLAYEY SILT	15	2"SS	23-E	—	43	—	—	—	
	STIFF, MOTTLED GRAY CLAYEY SILT (DECOMPOSED ROCK)	20	2"SS	23-F	—	39	—	—	—	40
	END OF BORING @ 21.5' 6-25-76									

* Elevation estimated from grading plan by Community Planning, Inc.

NEWTOWN ESTATES UNIT IV

TABLE I A - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	1	2	4	4
SAMPLE NO.	B	-	C	D
DEPTH BELOW SURFACE	2.5' - 4.0'	SURFACE	5.0' - 6.5'	10.0' - 11.5'
DESCRIPTION	TAN BROWN CLAYEY SILT	REDDISH BROWN CLAYEY SILT	MOTTLED BROWN CLAYEY SILT	MOTTLED TAN GRAY CLAYEY SILT
GRAIN-SIZE ANALYSIS (% Passing) Sieve				
1-1/2"				
1"				
1/2"				
#4				
#10				
#20				
#40				
#100				
#200				
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL	AIR DRIED	NATURAL	NATURAL
Liquid Limit	50	51	77	64
Plastic Limit	36	41	43	42
Plasticity Index	14	10	34	22
Dilatancy	SLOW-NONE	RAPID	SLOW-NONE	SLOW-NONE
Toughness	MED.-STIFF	WEAK-SOFT	MED.-STIFF	MED.-STIFF
Dry Strength	MED.	MED.	MED.	MED.
UNIFIED SOIL CLASSIFICATION	MH-ML	MH	MH	MH
APPARENT SPECIFIC GRAVITY		2.87		
CBR TEST (Surcharge - 51 P.S.F.)				
Molding Moisture, %		33		
Molding Dry Density, P.C.F.		89		
Swell upon saturation, %		NIL		
CBR at 0.1" Penetration		30		
MOISTURE-DENSITY RELATIONS OF SOILS				
(ASTM D-1557-70, Method A)		A		
Dry to Wet or Wet to Dry		WET TO DRY		
Max. Dry Density (P.C.F.)		88		
Optimum Moisture (%)		35		

REMARKS:

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 7-6-76 By W.W.

NEWTOWN ESTATES UNIT IV

TABLE I B - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	5	5		6
SAMPLE NO.	B	D		A
DEPTH BELOW SURFACE	2.5' - 4.0'	10.0' - 11.5'		0' - 1.5'
DESCRIPTION	BROWN CLAYEY SILT	MOTTLED TAN CLAY		BROWN CLAY
GRAIN-SIZE ANALYSIS (% Passing) Sieve				
1-1/2"				
1"				
1/2"				
#4				
#10				
#20				
#40				
#100				
#200				
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL	NATURAL		NATURAL
Liquid Limit	57	123		75
Plastic Limit	40	45		30
Plasticity Index	17	78		45
Dilatancy	SLOW-NONE	NONE		NONE
Toughness	MED.-STIFF	VERY STIFF		STIFF
Dry Strength	MED.	MED.-HIGH		HIGH
UNIFIED SOIL CLASSIFICATION	MH	CH		CH
APPARENT SPECIFIC GRAVITY				
CBR TEST (Surcharge - 51 P.S.F.)				
Molding Moisture, %				
Molding Dry Density, P.C.F.				
Swell upon saturation, %				
CBR at 0.1" Penetration				
MOISTURE-DENSITY RELATIONS OF SOILS (ASTM D-1557-70, Method ___)				
Dry to Wet or Wet to Dry				
Max. Dry Density (P.C.F.)				
Optimum Moisture (%)				

REMARKS:

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 7-6-76 By W.W.

NEWTOWN ESTATES UNIT IV

TABLE I C - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	10	10	11	11
SAMPLE NO.	—	B	—	C
DEPTH BELOW SURFACE	SURFACE	2.5' - 4.0'	SURFACE	4.5' - 6.0'
DESCRIPTION	REDDISH BROWN CLAYEY SILT	MOTTLED GRAY BROWN SILTY CLAY	REDDISH BROWN SILTY CLAY	REDDISH BROWN CLAY
GRAIN-SIZE ANALYSIS (% Passing)				
Sieve				
1-1/2"				
1"				
1/2"				
#4				
#10				
#20				
#40				
#100				
#200				
ATTERBERG LIMITS				
Air Dried or Natural	AIR DRY	NATURAL	AIR DRY	NATURAL
Liquid Limit	60	101	65	86
Plastic Limit	34	42	33	32
Plasticity Index	26	59	32	54
Dilatancy	RAPID-SLOW	NONE	NONE	NONE
Toughness	MED.-STIFF	VERY STIFF	VERY STIFF	VERY STIFF
Dry Strength	MED.-HIGH	MED.	MED.-HIGH	MED.
UNIFIED SOIL CLASSIFICATION	MH	MH-CH	MH	CH
APPARENT SPECIFIC GRAVITY	2.97		2.85	
CBR TEST (Surcharge - 51 P.S.F.)				
Molding Moisture, %	32		31	
Molding Dry Density, P.C.F.	92		92	
Swell upon saturation, %	0.7		0.5	
CBR at 0.1" Penetration	12		12	
MOISTURE-DENSITY RELATIONS OF SOILS (ASTM D-1557-70, Method ___)	A			
Dry to Wet or Wet to Dry	DRY TO WET			
Max. Dry Density (P.C.F.)	98			
Optimum Moisture (%)	30			

REMARKS:

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 7-6-76 By W.W.

NEWTOWN ESTATES UNIT IV

TABLE I D - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	12	14	17	17
SAMPLE NO.	A	-	-	B
DEPTH BELOW SURFACE	0.5' - 2.0'	SURFACE	SURFACE	2.5' - 4.0'
DESCRIPTION	REDDISH BROWN SILTY CLAY	BROWN SILTY CLAY	BROWN SILTY CLAY	REDDISH BROWN SILTY CLAY
GRAIN-SIZE ANALYSIS (% Passing) Sieve				
1-1/2"				
1"				
1/2"				
#4				
#10				
#20				
#40				
#100				
#200				
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL	AIR DRY	AIR DRY	NATURAL
Liquid Limit	77	74	64	72
Plastic Limit	35	36	32	37
Plasticity Index	42	38	32	35
Dilatancy	NONE	SLOW	SLOW	SLOW-NONE
Toughness	STIFF	MED.-STIFF	MED.-STIFF	MED.-STIFF
Dry Strength	MED.-HIGH	MED.-HIGH	MED.-HIGH	MED.-HIGH
UNIFIED SOIL CLASSIFICATION	MH-CH	MH	MH-CH	MH
APPARENT SPECIFIC GRAVITY			2.88	
CBR TEST (Surcharge - 51 P.S.F.)				
Molding Moisture, %		34	30	
Molding Dry Density, P.C.F.		86	94	
Swell upon saturation, %		2.0	1.6	
CBR at 0.1" Penetration		9.0	11	
MOISTURE-DENSITY RELATIONS OF SOILS (ASTM D-1557-70, Method ___)			A	
Dry to Wet or Wet to Dry			DRY TO WET	
Max. Dry Density (P.C.F.)			94	
Optimum Moisture (%)			31	

REMARKS:

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 7-6-76 By W.W.

NEWTOWN ESTATES UNIT IV

TABLE I E - SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	18	19	21	21
SAMPLE NO.	A	A	A	D
DEPTH BELOW SURFACE	0.5' - 2.0'	0' - 1.5'	0' - 1.5'	10' - 11.5'
DESCRIPTION	REDDISH BROWN SILTY CLAY	REDDISH BROWN CLAY	BROW SILTY CLAY	MOTTLED GRAY BROWN CLAY
GRAIN-SIZE ANALYSIS (% Passing) Sieve				
1-1/2"				
1"				
1/2"				
#4				
#10				
#20				
#40				
#100				
#200				
ATTERBERG LIMITS				
Air Dried or Natural	NATURAL	NATURAL	NATURAL	NATURAL
Liquid Limit	60	96	71	111
Plastic Limit	40	30	33	43
Plasticity Index	20	66	38	68
Dilatancy	RAPID-SLOW	NONE	SLOW-NONE	SLOW-NONE
Toughness	MED.-STIFF	VERY STIFF	MED.-STIFF	VERY STIFF
Dry Strength	MED.-HIGH	MED.-HIGH	MED.-HIGH	MED.
UNIFIED SOIL CLASSIFICATION	MH	CH	CH-MH	CH
APPARENT SPECIFIC GRAVITY				
CBR TEST (Surcharge - 51 P.S.F.)				
Molding Moisture, %				
Molding Dry Density, P.C.F.				
Swell upon saturation, %				
CBR at 0.1" Penetration				
MOISTURE-DENSITY RELATIONS OF SOILS (ASTM D-1557-70, Method)				
Dry to Wet or Wet to Dry				
Max. Dry Density (P.C.F.)				
Optimum Moisture (%)				

REMARKS:

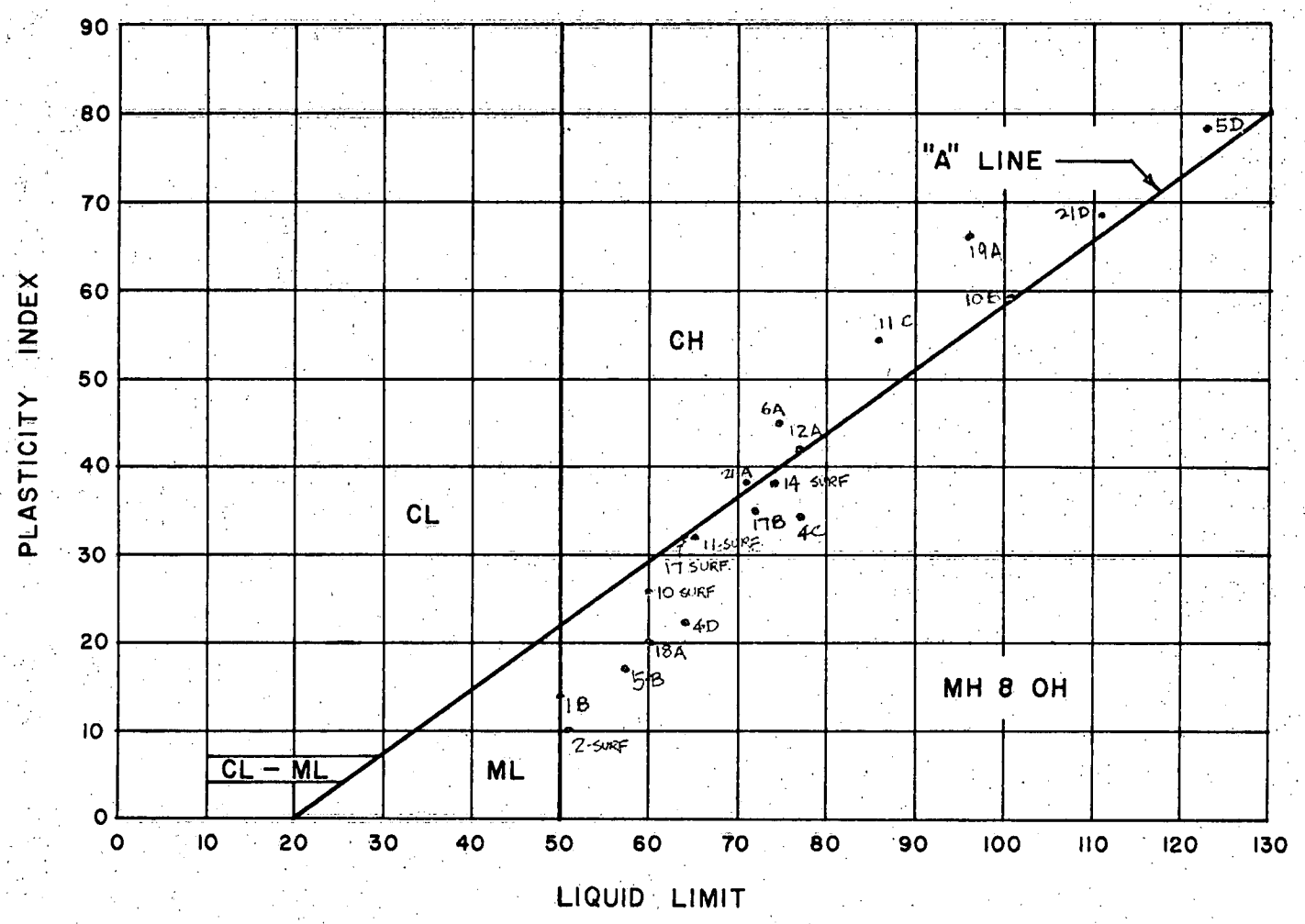
WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

Date 7-6-76 By W.W.

PLASTICITY CHART

PROJECT: NEWTOWN ESTATES - UNIT IV

LOCATION: WAIMALU, OAHU, HAWAII



DATE 7-9-76 BY SHL

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

3-872

MOISTURE-DENSITY CURVE (ASTM D-1557-70, METHOD A)

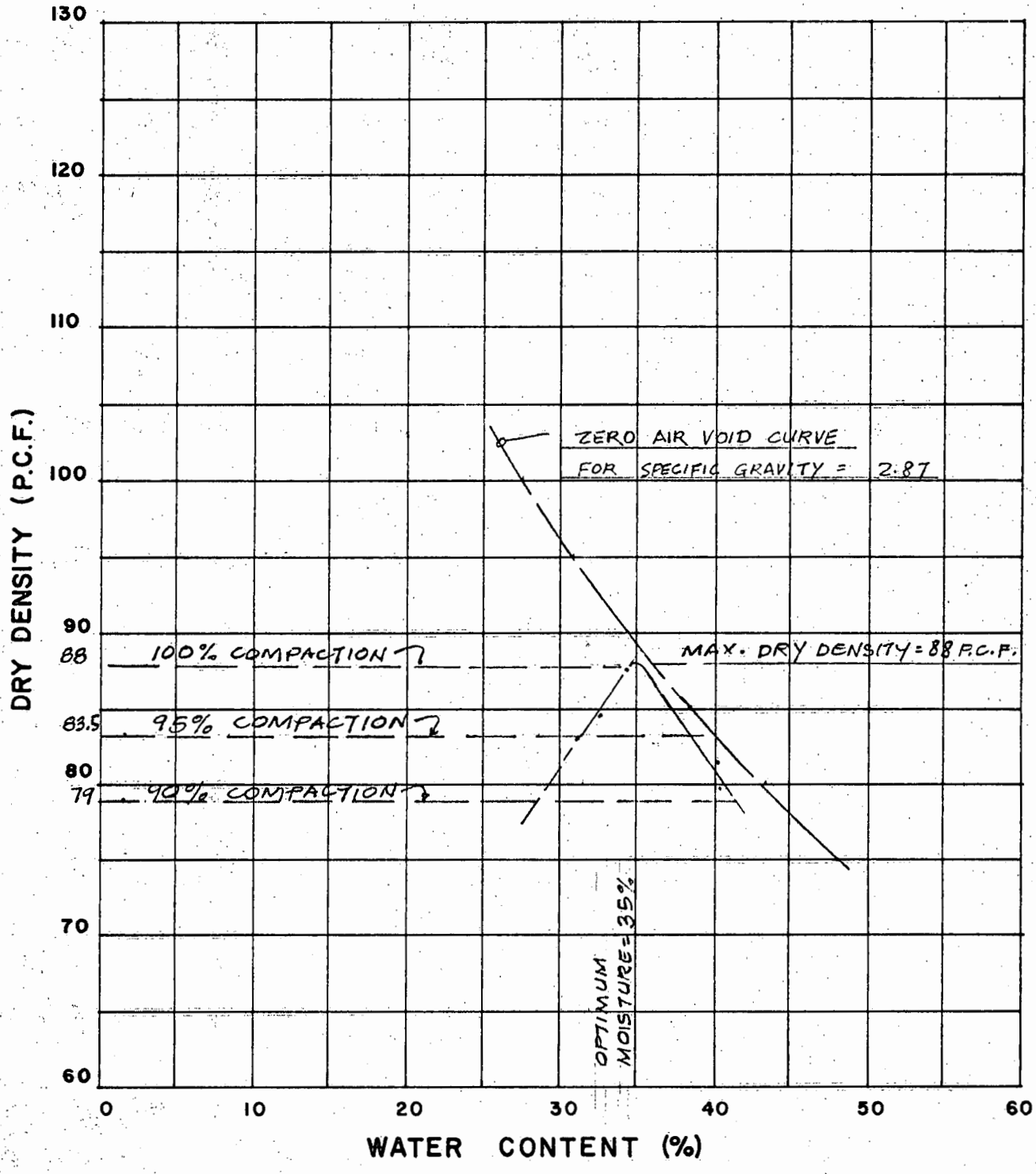
PROJECT: NEWTOWN ESTATES UNIT IV

LOCATION: WAIMALU, OAHU, HAWAII

SAMPLE NO.: 2 - SURFACE

SAMPLE DESCRIPTION: REDDISH BROWN CLAYEY SILT

AGGREGATE: MINUS #4
MOLD SIZE: 4"ϕ x 4.58" Ht.
HAMMER: 10 lb. 18 in. drop
LAYERS: 5 LAYERS
BLOWS: 25/LAYER



WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

DATE 7-6-76 BY W.W.

3-775

MOISTURE-DENSITY CURVE (ASTM D-1557-70, METHOD A)

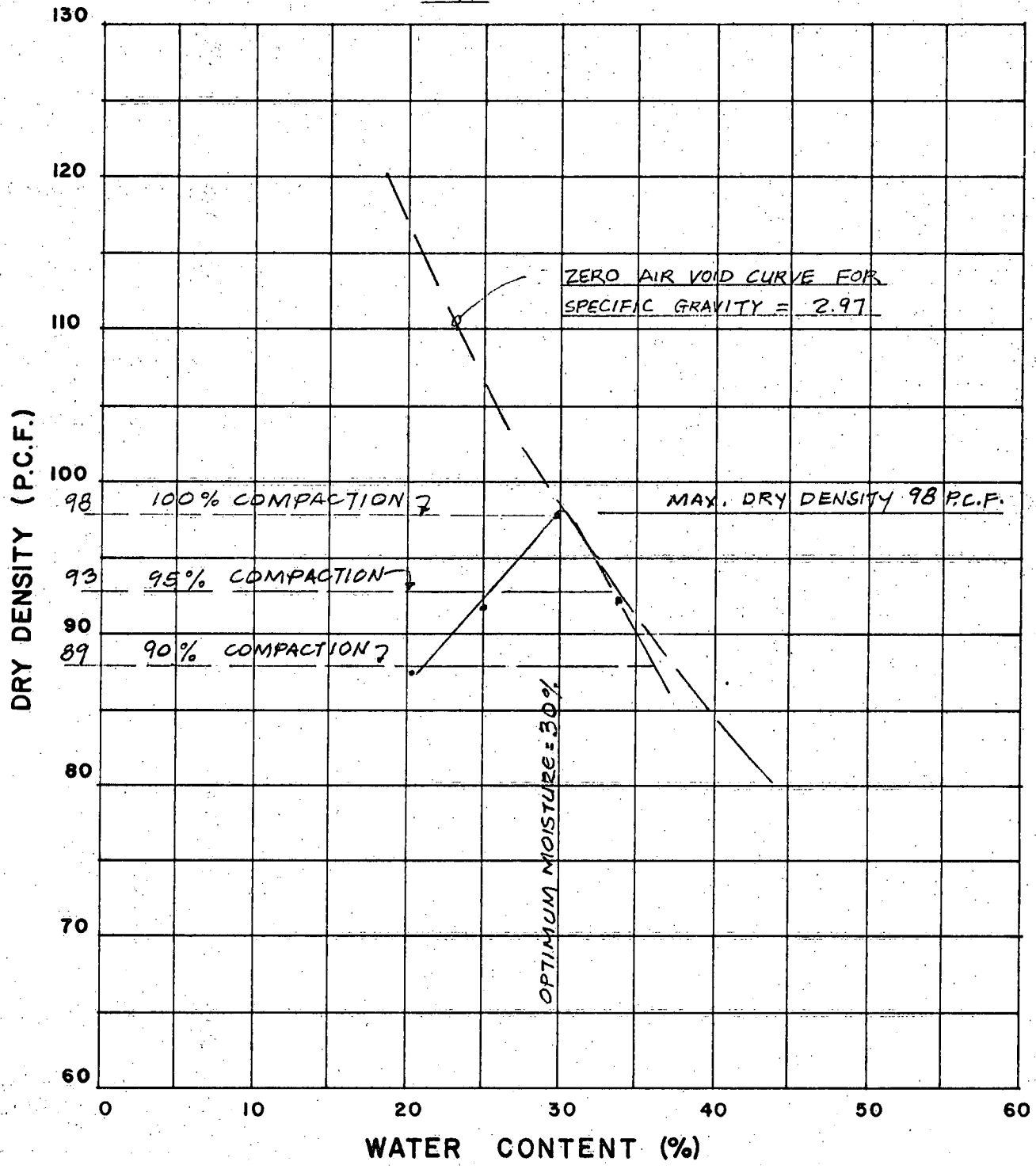
PROJECT: NEWTOWN ESTATES UNIT IV

LOCATION: WAIMALU, OAHU, HAWAII

SAMPLE NO.: 10-SURFACE

SAMPLE DESCRIPTION: REDDISH BROWN CLAYEY SILT.

AGGREGATE: 1/4" MINUS
MOLD SIZE: 4"ϕ x 4.584"H
HAMMER: 10 LBS
LAYERS: 5
BLOWS: 25 /LAYER



WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

DATE 7-6-76 BY FM

MOISTURE-DENSITY CURVE (ASTM D-1557-70, METHOD D)

PROJECT: NEWTOWN ESTATES - UNIT IV

LOCATION: WAIMALU, OAHU, HAWAII

SAMPLE NO.: 11 - SURFACE

SAMPLE DESCRIPTION: REDDISH BROW SILTY CLAY

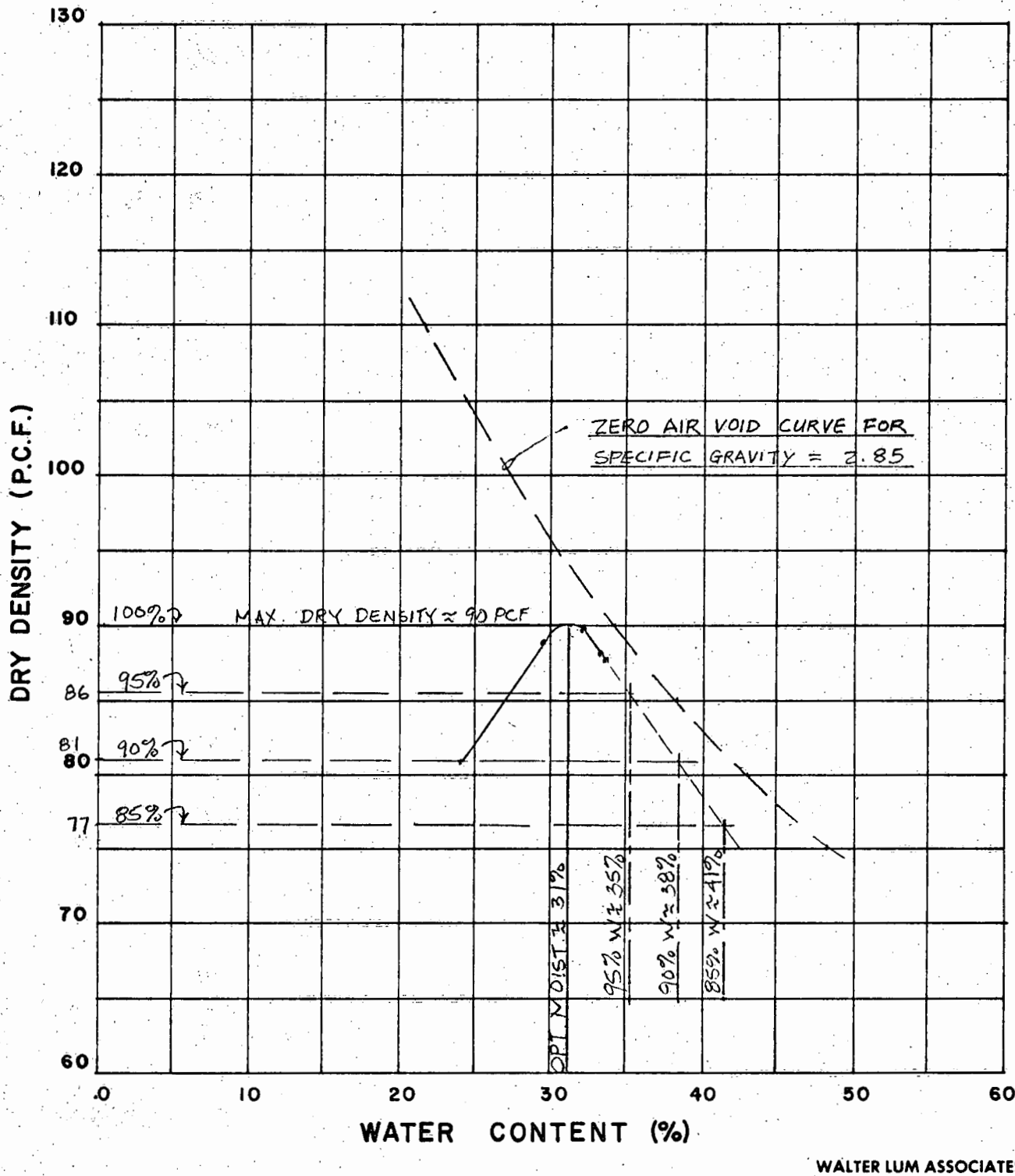
AGGREGATE: 3/4" MINUS

MOLD SIZE: 6"Ø X 4.584" HIGH

HAMMER: 10LBS. 18" DROP

LAYERS: 5

BLOWS: 56 / LAYER



WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

DATE 7-6-76 BY W.W.

2-775

MOISTURE-DENSITY CURVE (ASTM D-1557-70, METHOD A)

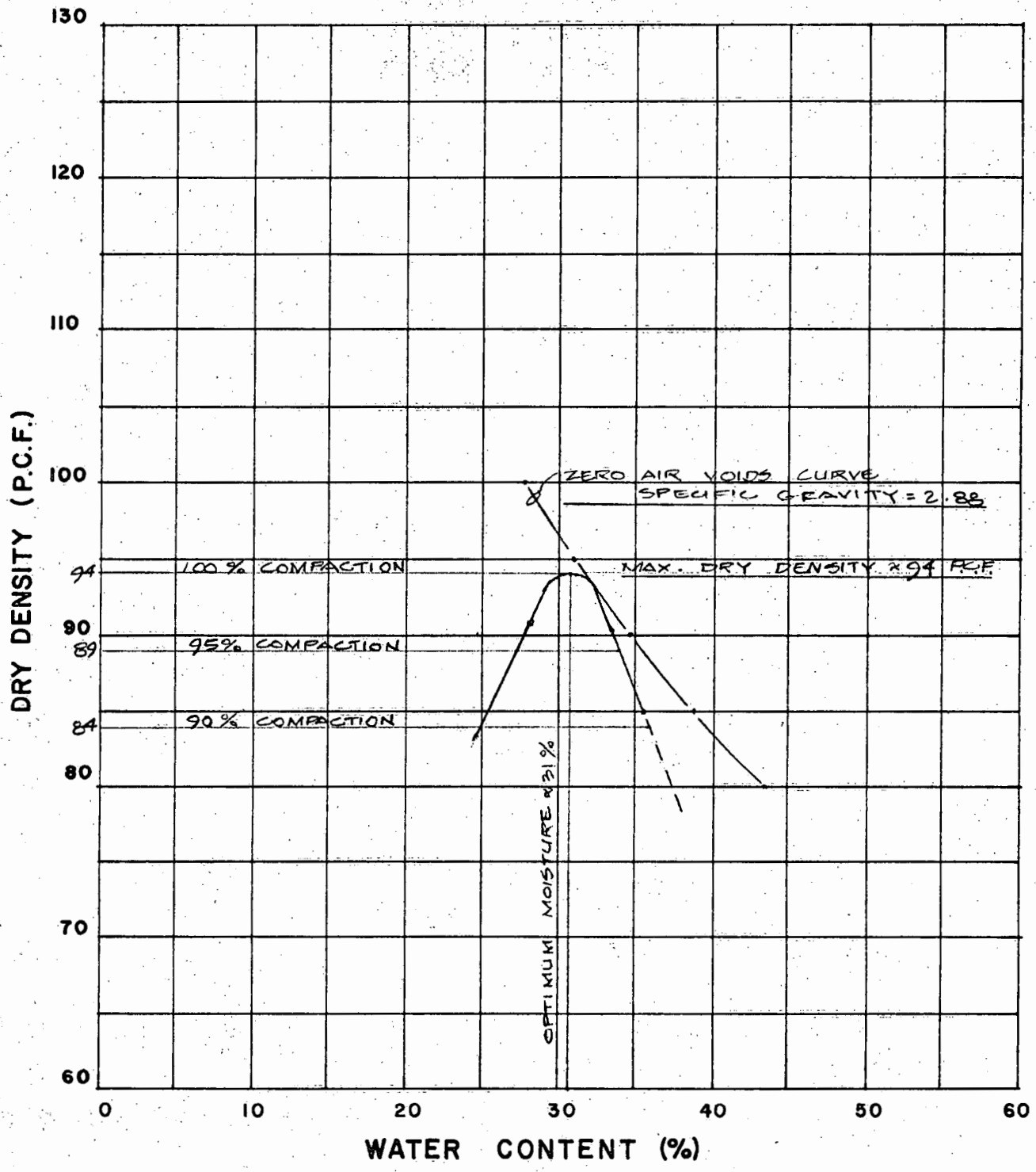
PROJECT: NEWTOWN ESTATES UNIT IV

LOCATION: WAIMALU, OAHU, HAWAII

SAMPLE NO.: 17 SURFACE

SAMPLE DESCRIPTION: BROWN SILTY CLAY

AGGREGATE: 1/4" MINUS
MOLD SIZE: 4" ø x 4.584" HIGH
HAMMER: 10 LBS
LAYERS: 5
BLOWS: 25/LAYER



WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

DATE 7-13-76 BY FM

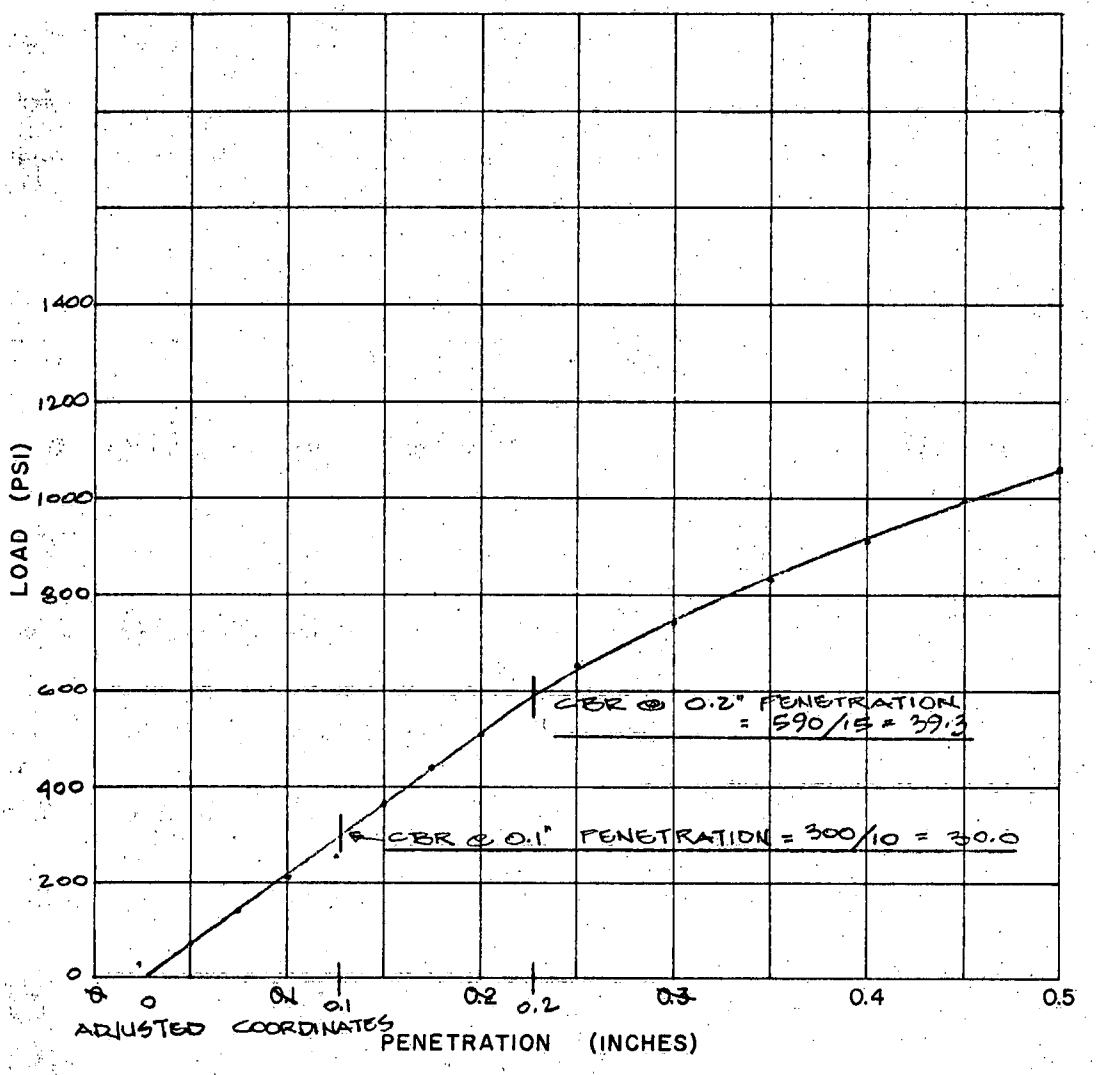
CBR TEST

PROJECT: NEWTOWN ESTATES UNIT IV

LOCATION: WAIMALU, OAHU, HAWAII

SAMPLE NO: 2 - SURFACE

SAMPLE DESCRIPTION: REDDISH BROWN CLAYEY SILT



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS.)	LOAD (PSI)
0.025	80	27
0.050	230	77
0.075	420	140
0.100	630	210
0.125	750	250
0.150	1090	363
0.175	1320	440
0.200	1540	513
0.250	1950	650
0.300	2240	747
0.350	2510	837
0.400	2730	910
0.450	2980	993
0.500	3170	1057

AGGREGATE 1/4" MINUS

HAMMER WEIGHT 10 LBS

HAMMER DROP 18 INS.

No. OF BLOWS 56/LAYER

No. OF LAYERS 5

TEST RESULTS:

MOLDING MOISTURE, %. 33.2

MOLDING DRY DENSITY, P.C.F. 88.9

CBR @ 0.1" PENETRATION 30.0

DATE 6-29-76 BY GYS

DATE 7-6-76 BY FM

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

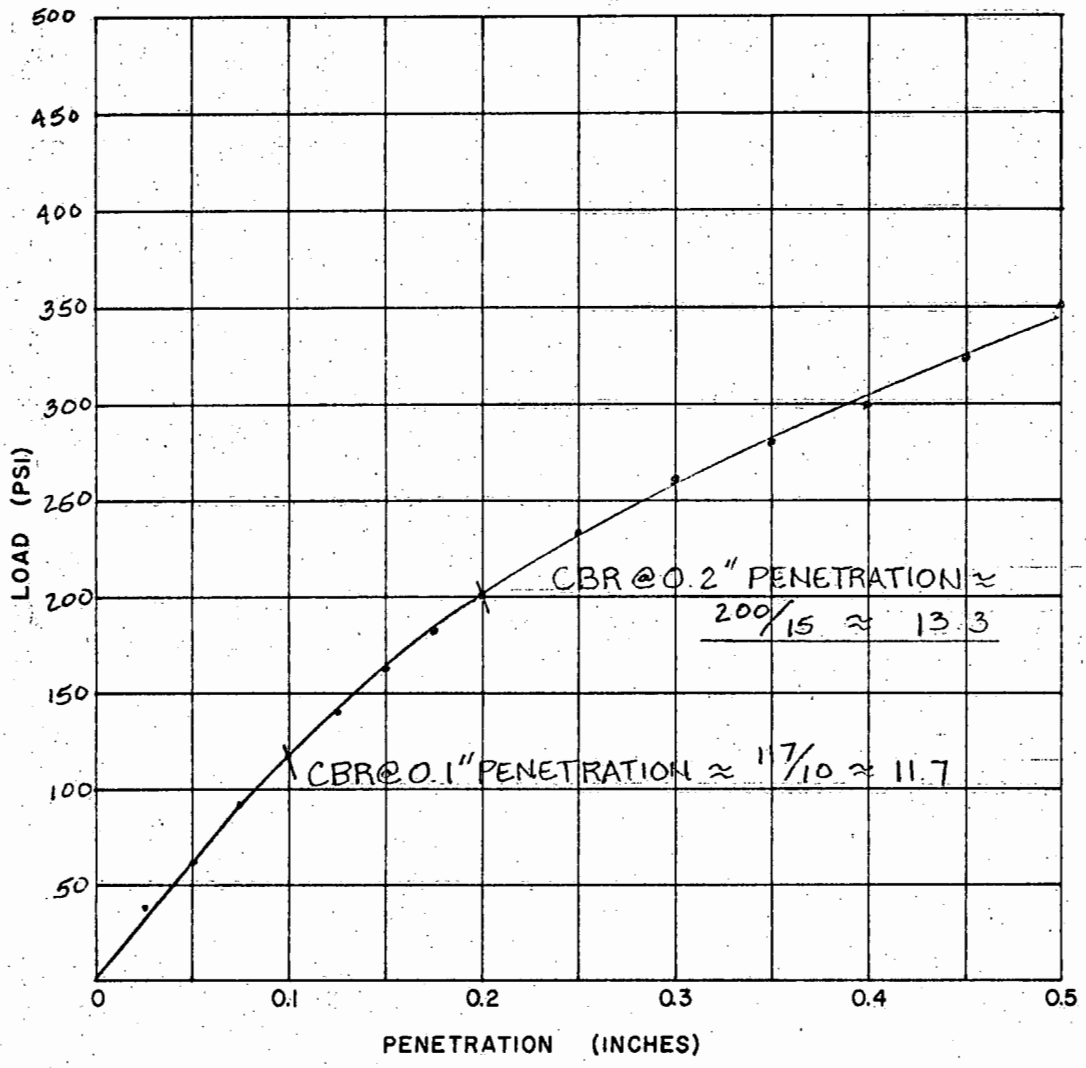
CBR TEST

PROJECT: NEWTOWN ESTATES UNIT IV

LOCATION: WAIMALU, OAHU, HAWAII

SAMPLE NO: 10 - SURFACE

SAMPLE DESCRIPTION: REDDISH BROWN CLAYEY SILT



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS.)	LOAD (PSI)
0.025	110	37
0.050	190	63
0.075	280	93
0.100	350	117
0.125	420	140
0.150	490	163
0.175	550	183
0.200	600	200
0.250	700	233
0.300	780	260
0.350	830	277
0.400	900	300
0.450	970	323
0.500	1050	350

AGGREGATE 1/4" MINUS

HAMMER WEIGHT 10 LBS.

HAMMER DROP 18 INS.

No. OF BLOWS 56/LAYER

No. OF LAYERS 5

TEST RESULTS:

MOLDING MOISTURE, %. 31.7

MOLDING DRY DENSITY, P.C.F. 92.2

CBR @ 0.1" PENETRATION 11.7

DAYS SOAKED 4

DATE 6-28-76 BY GYS

DATE 6-29-76 BY RH

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

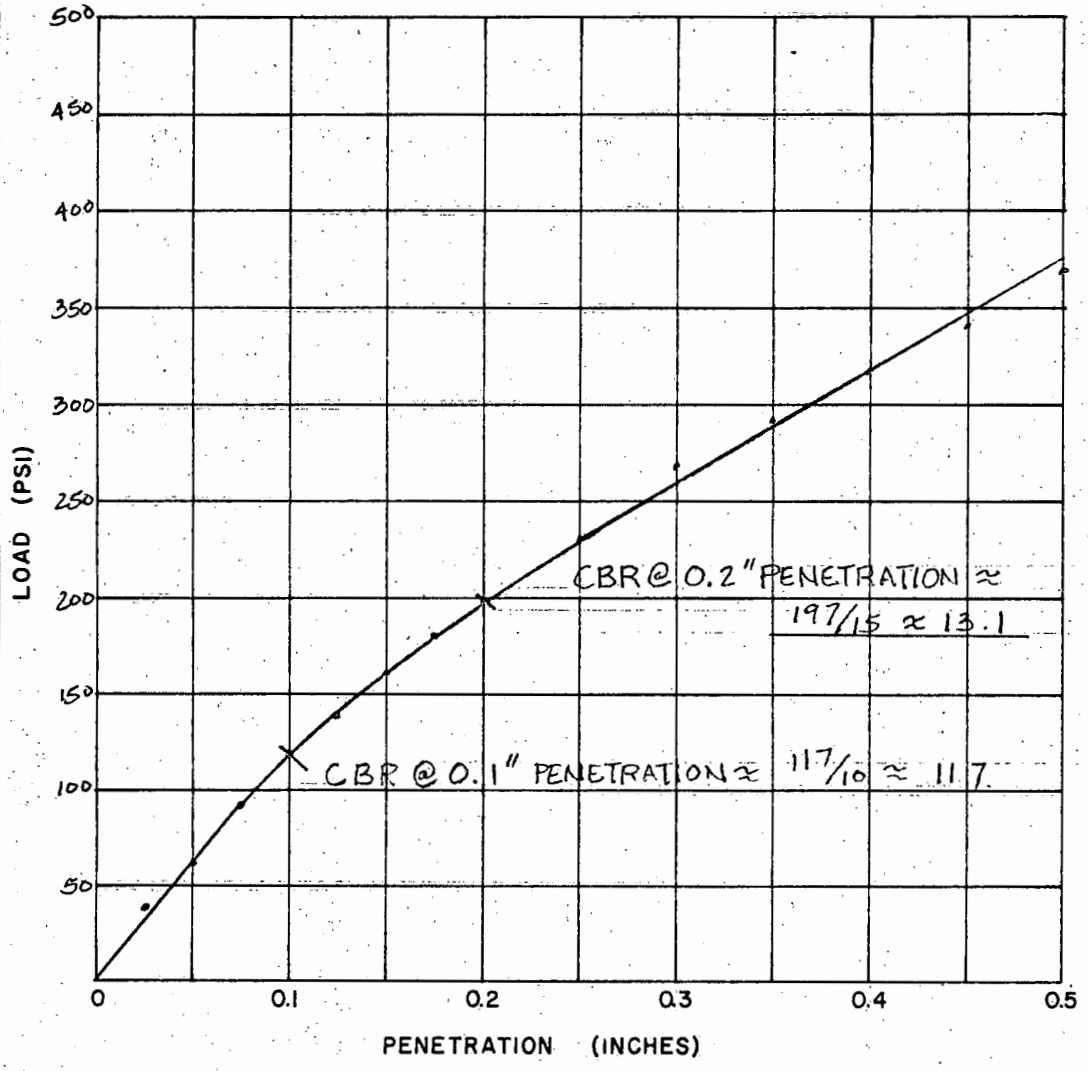
CBR TEST

PROJECT: NEWTOWN ESTATES UNIT IV

LOCATION: WAIMALU, OAHU, HAWAII

SAMPLE NO: II-SURFACE

SAMPLE DESCRIPTION: REDDISH BROWN SILTY CLAY



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS.)	LOAD (PSI)
0.025	110	37
0.050	190	63
0.075	280	93
0.100	350	117
0.125	410	137
0.150	480	160
0.175	540	180
0.200	590	197
0.250	700	233
0.300	800	267
0.350	880	293
0.400	950	317
0.450	1030	343
0.500	1110	370

AGGREGATE 1/4" MINUS

HAMMER WEIGHT 10 LBS.

HAMMER DROP 18 INS.

No. OF BLOWS 56/LAYER

No. OF LAYERS 5

TEST RESULTS:

MOLDING MOISTURE, %. 30.9

MOLDING DRY DENSITY, P.C.F. 92.4

CBR @ 0.1" PENETRATION 11.7

DAYS SOAKED 4

DATE 6-28-76 BY G.Y.S.

DATE 6-29-76 BY R.H.

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

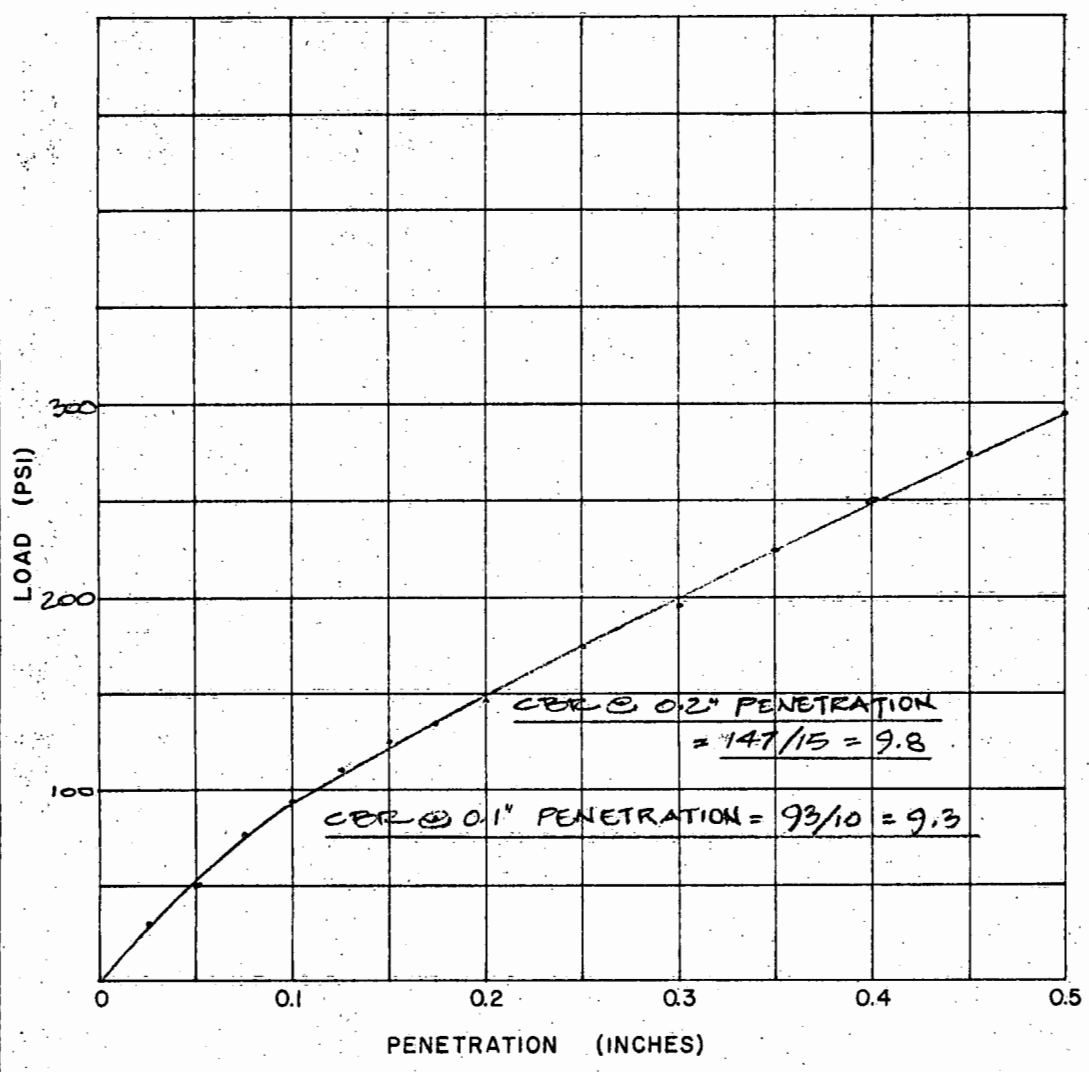
CBR TEST

PROJECT: NEWTOWN ESTATES UNIT IV

LOCATION: WAIMALU, OAHU, HAWAII

SAMPLE NO: 14-SURFACE

SAMPLE DESCRIPTION: BROWN SILTY CLAY



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS.)	LOAD (PSI)
0.025	90	30
0.050	150	50
0.075	230	77
0.100	280	93
0.125	330	110
0.150	370	123
0.175	400	133
0.200	440	147
0.250	520	173
0.300	590	197
0.350	670	223
0.400	750	250
0.450	820	273
0.500	880	293

AGGREGATE 1/4" MINUS

HAMMER WEIGHT 10 LBS

HAMMER DROP 18 INS.

No. OF BLOWS 56/LAYER

No. OF LAYERS 5

TEST RESULTS:

MOLDING MOISTURE, %. 34.3

MOLDING DRY DENSITY, P.C.F. 85.5

CBR @ 0.1" PENETRATION 9.3

DATE 6-25-76 BY RM

DATE 6-29-76 BY FM

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

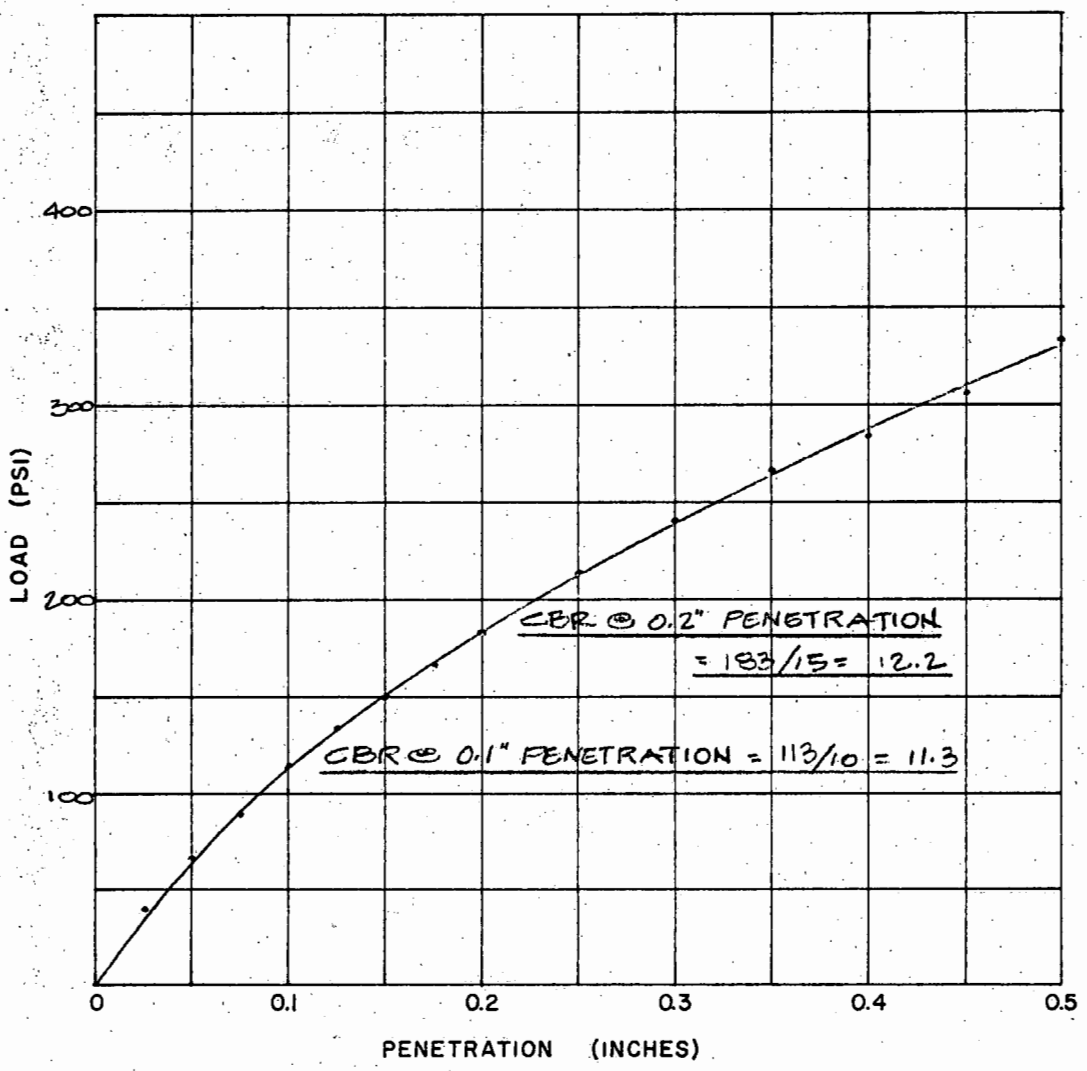
CBR TEST

PROJECT: NEWTOWN ESTATES UNIT IV

LOCATION: WAIMALU, OAHU, HAWAII

SAMPLE NO: 17 - SURFACE

SAMPLE DESCRIPTION: BROWN SILTY CLAY



CBR PENETRATION DATA

PENETRATION (INCHES)	LOAD (LBS.)	LOAD (PSI)
0.025	120	40
0.050	200	67
0.075	270	90
0.100	340	113
0.125	400	133
0.150	450	150
0.175	500	167
0.200	550	183
0.250	640	213
0.300	720	240
0.350	800	267
0.400	850	283
0.450	920	307
0.500	1000	333

AGGREGATE 1/4" MINUS

HAMMER WEIGHT 10 LBS.

HAMMER DROP 18 INS.

No. OF BLOWS 56/LAYER

No. OF LAYERS 5

TEST RESULTS:

MOLDING MOISTURE, %. 29.5

MOLDING DRY DENSITY, P.C.F. 94.3

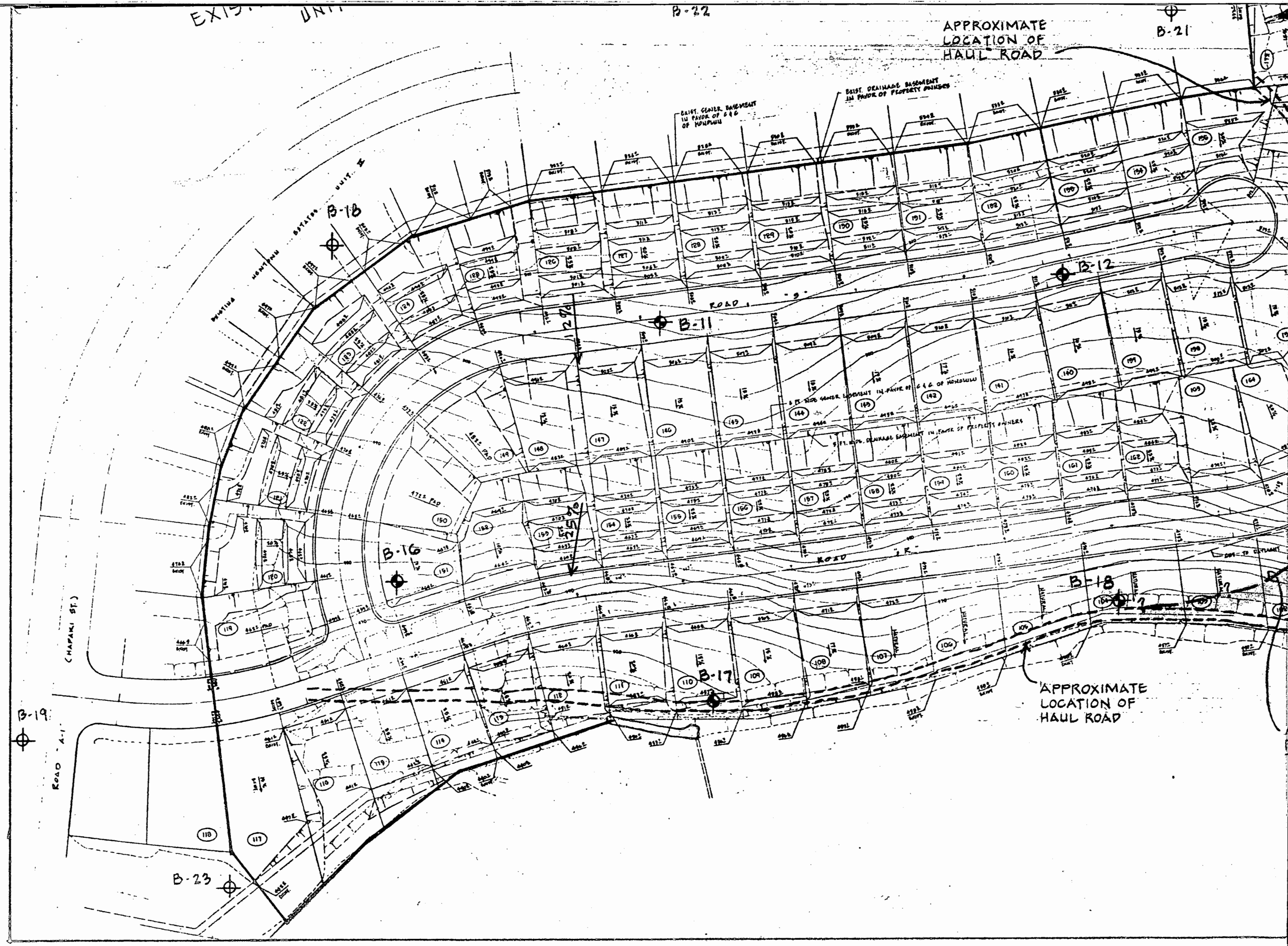
CBR @ 0.1" PENETRATION 11.3

DATE 6-25-76 BY RM

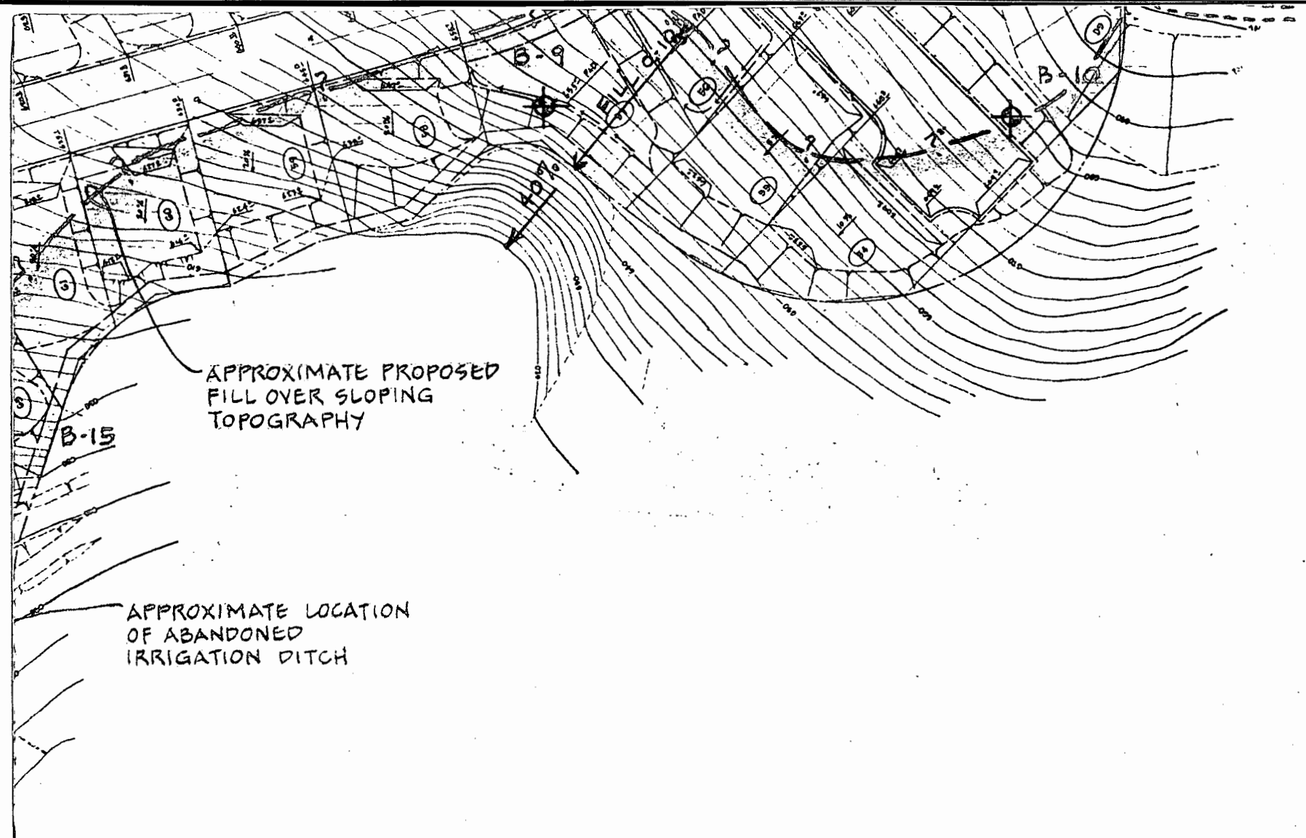
DATE 6-29-76 BY FM

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

10-470


B-22
B-21
APPROXIMATE LOCATION OF HAUL ROAD
B-18
B-12
B-11
B-16
B-17
B-19
B-23
APPROXIMATE LOCATION OF HAUL ROAD
(HAPAKI ST.)
ROAD "A-1"
ROAD "F"
ROAD "J"
ROAD "K"
EXIST. SEWER EASEMENT IN FAVOR OF C & C OF HONOLULU
EXIST. DRAINAGE EASEMENT IN FAVOR OF PROPERTY OWNERS
472± PAD
25%


B-6
B-13
B-14
B-19
B-20
B-21
B-22
B-23
ROAD
ROAD
ROAD
ROAD
ROAD
10%
25%
25%
12%
30%
25%
20%
FILL OF 20 FT
FILL OF 10 FT
FILL OF 15 FT
APPROXIMATE PROPOSED FILL OVER SLOPING TOPOGRAPHY
APPROXIMATE LOCATION OF HAUL ROAD



PROJECT LOCATION SKETCH

LEGEND

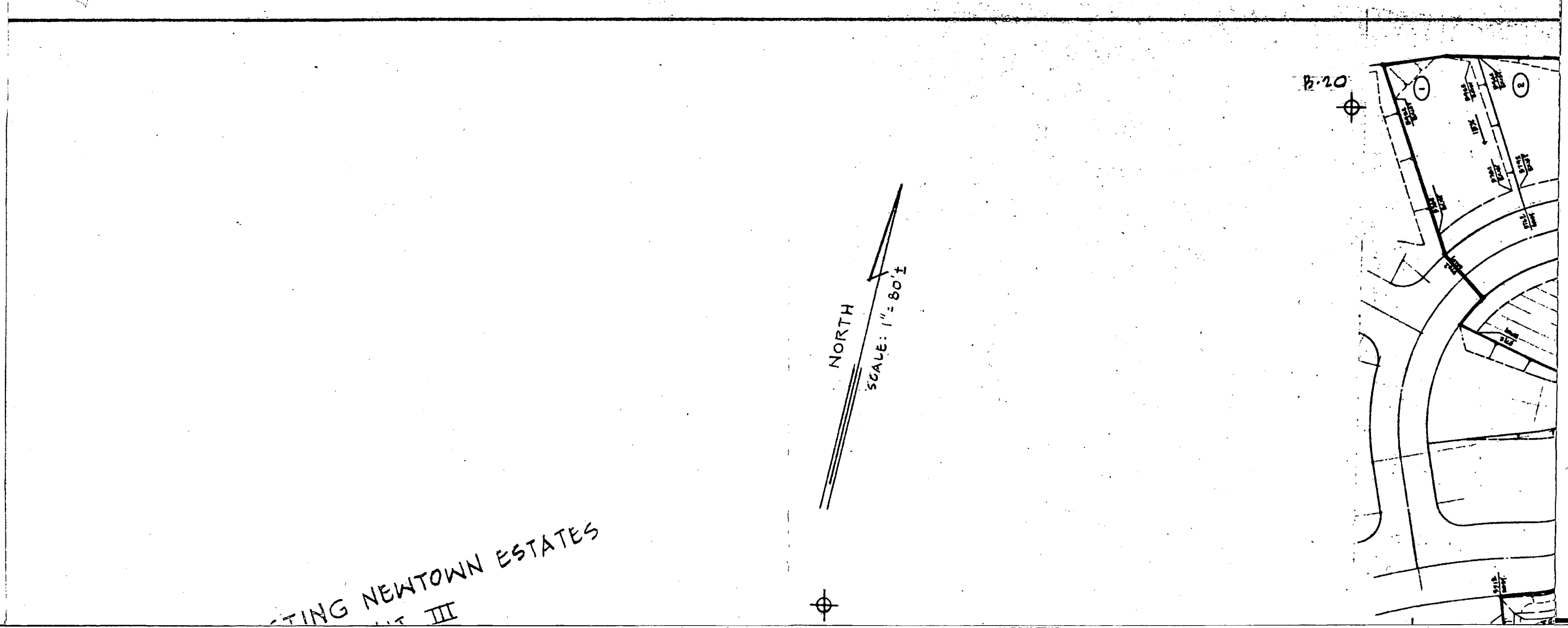
- BORING FOR THIS PROJECT
- BORING FOR "NEW TOWN ESTATES - UNIT III, JULY 23, 1973
- IRRIGATION DITCH
- HAUL ROAD
- 20% — APPROXIMATE GRADIENT OF THE EXISTING SLOPE
- FILL 0-10'± — ESTIMATED DEPTHS OF FILLS/OVER SLOPING TOPOGRAPHY. FILLS SHOULD BE CONSTRUCTED WITH CARE

BORING LOCATION SKETCH
NEWTOWN ESTATES - UNIT IV
WAIMALU, EWA, OAHU, HAWAII
TAX MAP KEY: 9-8-02: POR. 9

Dr. EH
Date 7/76
Rev

WALTER LUM ASSOCIATES, INC.
3030 WAIALAE AVE.
CIVIL ENGINEERS
PHONE 737-7931

Sheet
of



EXISTING NEWTOWN ESTATES
UNIT III

PUNANANI GULCH.

JEEP TRAIL
(OLD HAUL ROA

B-1

B-2

B-3

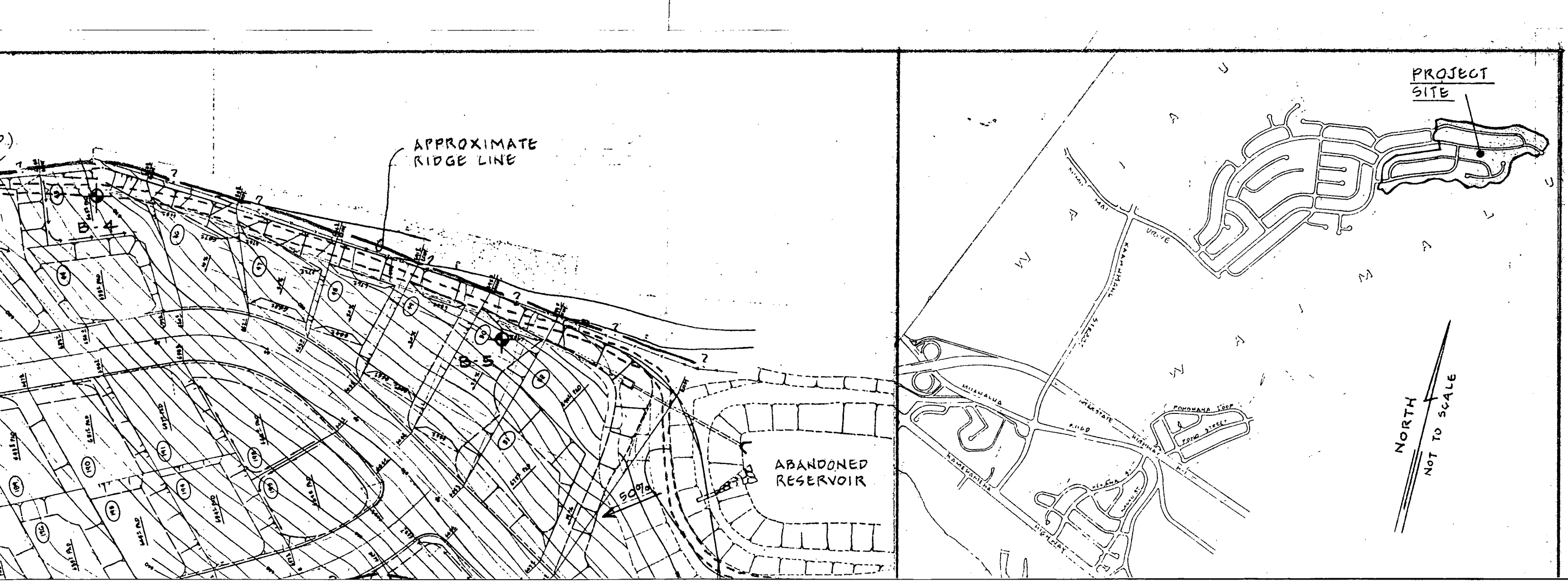
B-7

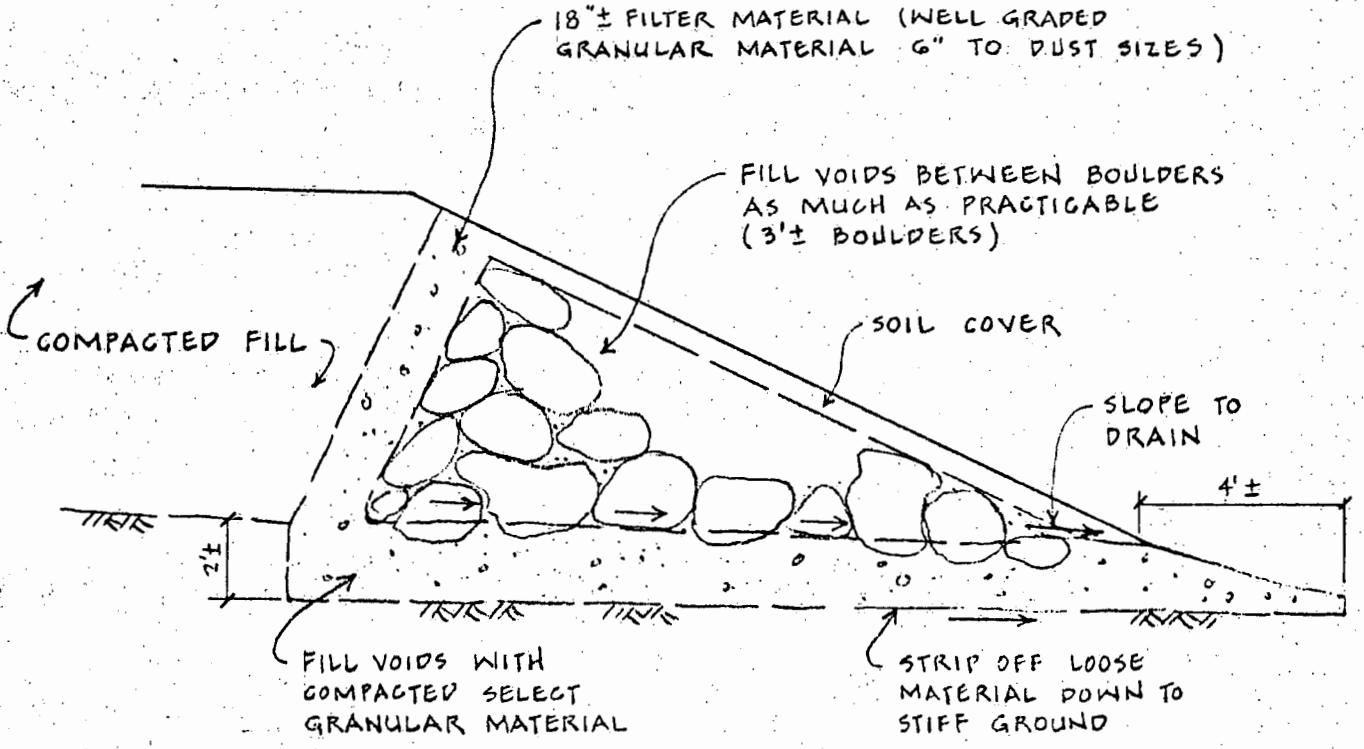
B-8

ROAD

ROAD

ROAD


APPROXIMATE
RIDGE LINE
B-4
B-5
ABANDONED
RESERVOIR
50%
PROJECT
SITE
NORTH
NOT TO SCALE



SECTION
NOT TO SCALE

FIGURE 1

SUGGESTED BOULDER FILL

NEWTOWN ESTATES - UNIT IV

WAIMALU, EWA, OAHU, HAWAII

WALTER LUM ASSOCIATES, INC.
CIVIL, STRUCTURAL, SOILS ENGINEERS

JULY, 1976

LIMITATIONS

In general, soil formations are commonly erratic and rarely uniform or regular. The boring logs indicate the approximate subsurface soil conditions encountered only at the drill holes where the borings were made at the times designated on the logs and may not represent conditions between borings, at other locations, or at other dates. Soil conditions and water levels may change with the weather, passage of time and construction methods or improvements at the site.

During construction, should subsurface conditions much different from those in the borings be observed, encountered, or otherwise indicated, we should be advised immediately to review or reconsider our recommendations in light of the new developments.

If there is a substantial lapse of time between the submission of this report and the start of work at the site, or if conditions have changed due to natural causes, plan changes, or construction operations at or adjacent to the site, it is recommended that this report be reviewed to determine the applicability of the recommendations considering the time lapse, changed conditions, and changes in the state of the art of soil engineering.

Our professional services were performed, findings obtained and recommendations prepared in accordance with generally accepted engineering practices. This warranty is in lieu of all other warranties expressed or implied.

LIMITATIONS (cont'd.)

Contract documents and specifications often prescribe supervision by the soil engineer. It should be understood by all parties that the soil engineer's actual scope of work is very limited. We as the soil engineer do not assume the day to day physical direction of the works, nor minute examination of the elements, nor do we assume the responsibility for the safety of the contractor's workmen. Supervision, inspection, control, etc., by the soil engineer generally mean taking of soil tests and making visual observations, sometimes on only an intermittent basis relating to earthwork or foundations for the project. The soil engineer does not guarantee the contractors' performance, but rather looks for general conformance to the intent of the plans and soil report. Any discrepancy noted by the soil engineer regarding earthwork or foundations will be referred to the project engineer or architect or contractor for action.

Although the soil report may comment or discuss construction techniques or procedures for the design engineer's guidance, the report should not be interpreted to prescribe or dictate construction procedures or to relieve the contractor in anyway of his responsibility for the construction.